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1 General information

Welcome to the new module handbook of your study program! We are delighted that you have decided to study at the KIT Department of Economics and Management and wish you a good start into the new semester! In the following we would like to give you a short introduction to the most important terms and rules that are important in connection with the choice of modules, courses and examinations.

1.1 Structural elements

The program exists of several subjects (e.g. business administration, economics, operations research). Every subject is split into modules and every module itself consists of one or more interrelated module component exams. The extent of every module is indicated by credit points (CP), which will be credited after the successful completion of the module. Some of the modules are obligatory. According to the interdisciplinary character of the program, a great variety of individual specialization and deepening possibilities exists for a large number of modules. This enables the student to customize content and time schedule of the program according to personal needs, interest and job perspective. The module handbook describes the modules belonging to the program. It describes particularly:

- the structure of the modules
- the extent (in CP),
- the dependencies of the modules,
- the learning outcomes,
- the assessment and examinations.

The module handbook serves as a necessary orientation and as a helpful guide throughout the studies. The module handbook does not replace the course catalog, which provides important information concerning each semester and variable course details (e.g. time and location of the course).

1.2 Begin and completion of a module

Each module and each examination can only be selected once. The decision on the assignment of an examination to a module (if, for example, an examination in several modules is selectable) is made by the student at the moment when he / she is registered for the appropriate examination. A module is completed or passed when the module examination is passed (grade 4.0 or better). For modules in which the module examination is carried out over several partial examinations, the following applies: The module is completed when all necessary module partial examinations have been passed. In the case of modules which offer alternative partial examinations, the module examination is concluded with the examination with which the required total credit points are reached or exceeded. The module grade, however, is combined with the weight of the predefined credit points for the module in the overall grade calculation.

1.3 Module versions

It is not uncommon for modules to be revised due to, for example, new courses or cancelled examinations. As a rule, a new module version is created, which applies to all students who are new to the module. On the other hand, students who have already started the module enjoy confidence and remain in the old module version. These students can complete the module on the same conditions as at the beginning of the module (exceptions are regulated by the examination committee). The date of the student’s "binding declaration" on the choice of the module in the sense of §5(2) of the Study and Examination Regulation is decisive. This binding declaration is made by registering for the first examination in this module.

In the module handbook, all modules are presented in their current version. The version number is given in the module description. Older module versions can be accessed via the previous module handbooks in the archive at [http://www.wiwi.kit.edu/Archiv_MHB.php](http://www.wiwi.kit.edu/Archiv_MHB.php).

1.4 General and partial examinations

Module examinations can be either taken in a general examination or in partial examinations. If the module examination is offered as a general examination, the entire learning content of the module will be examined in a single examination. If the module examination is subdivided into partial examinations, the content of each course will be examined in corresponding partial examinations. Registration for examinations can be done online at the campus management portal. The following functions can be accessed on [https://campus.studium.kit.edu/](https://campus.studium.kit.edu/):

- Register/unregister for examinations
- Check for examination results
- Create transcript of records

For further and more detailed information, see [https://campus.studium.kit.edu/faq.php](https://campus.studium.kit.edu/faq.php).
1.5 Types of examinations
Examinations are split into written examinations, oral examinations and alternative exam assessments ("Prüfungsleistungen anderer Art"). Examinations are always graded. Non exam assessments ("Studienleistungen") can be repeated several times and are not graded.

1.6 Repeating examinations
Principally, a failed written exam, oral exam or alternative exam assessment can repeated only once. If the repeat examination (including an eventually provided verbal repeat examination) will be failed as well, the examination claim is lost. A request for a second repetition has to be made in written form to the examination committee two months after loosing the examination claim. For further information see http://www.wiwi.kit.edu/hinweiseZweitwdh.php.

1.7 Examiners
The examination committee has appointed the KIT examiners and lecturers listed in the module handbook for the modules and their courses as examiners for the courses they offer.

1.8 Additional accomplishments
Additional accomplishments are voluntarily taken exams, which have no impact on the overall grade of the student and can take place on the level of single courses or on entire modules. It is also mandatory to declare an additional accomplishment as such at the time of registration for an exam. Additional accomplishments with at most 30 CP may appear additionally in the certificate.

1.9 Further information
For current information about studying at the KIT Department of Economics and Management, please visit our website www.wiwi.kit.edu as well as Instagram, LinkedIn, and YouTube. Please also see current notices and announcements for students at: https://www.wiwi.kit.edu/studium.php.
Information around the legal and official framework of the study program can be found in the respective study and examination regulations of your study program. These are available under the Official Announcements of KIT (http://www.sle.kit.edu/amtlicheBekanntmachungen.php).
More detailed information about the legal and general conditions of the program can be found in the examination regulation of the program (http://www.sle.kit.edu/amtlicheBekanntmachungen.php).

1.10 Contact
If you have any questions about modules or exams, please contact the examination office of the KIT Department of Economics and Management:

Ralf Hilser
Anabela Relvas
Telefon +49 721 608-43768
E-Mail: pruefungssekretariat@wiwi.kit.edu

Editorial responsibility:

Dr. André Wiesner
Telefon: +49 721 608-44061
Email: modul@wiwi.kit.edu
2 Study plan

The Bachelor's degree program in Industrial Engineering and Management entails a six-semester standard study period. The basic program in the first three semesters is systematically structured. In the fourth to fifth semesters, a more advanced, specialization program that can be structured depending on one's personal interests and goals is offered.

Figure 2 shows the course and module structure with the respective credit points as well as an example of a possible distribution of modules and courses in the basic program over the semesters, which has proven to be useful.

<table>
<thead>
<tr>
<th>Term</th>
<th>Credits</th>
<th>Business Administration</th>
<th>Economics</th>
<th>Informatics</th>
<th>Operations Research</th>
<th>Engineering</th>
<th>Statistics</th>
<th>Mathematics</th>
<th>Electives</th>
<th>Internship</th>
<th>Bachelor Thesis</th>
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<tbody>
<tr>
<td>1 (WT)</td>
<td>28</td>
<td>Management and Marketing 5 LP</td>
<td>ECON 1 5 CP</td>
<td>PROG 1 5 CP</td>
<td>Mat. Science (M) 1 3 CP</td>
<td>MATH 1 10 CP</td>
<td></td>
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<td></td>
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<tr>
<td>2 (ST)</td>
<td>34</td>
<td>Financing and Accounting 5 LP</td>
<td>ECON 2 5 CP</td>
<td>INFO 1 5 CP</td>
<td>OR</td>
<td>Elect. Eng. 1 3 CP</td>
<td>MATH 2 7 CP</td>
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<tr>
<td>3 (WT)</td>
<td>30</td>
<td>Production, Logistics and Intf. Systems 5 CP</td>
<td>INFO 2 5 CP</td>
<td>9 LP</td>
<td>Eng. Mech. (LM) 1 3 CP</td>
<td>STAT 2 5 CP</td>
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<tr>
<td>4 (ST)</td>
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<td>ECON 9 CP</td>
<td>INFO 9 CP</td>
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<td>MATH 3 4 CP</td>
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<td></td>
<td></td>
<td>ENG 9 CP</td>
<td>Internship 10 CP</td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

Figure 2: Structure of the Bachelor's degree program in Industrial Engineering and Management SPO 2015 as of winter semester 2021/2022 (recommended)

In the basic program (blue), the business administration, economics, informatics, operations research, engineering sciences, statistics and mathematics modules are compulsory. In the 3rd semester, one can choose between Material Transformation and Balances, Engineering Mechanics and Material Science in the engineering basic module.

In the specialization program (green), a module must be selected from each of the following areas: business administration, economics, informatics, operations research and engineering. As part of the mandatory courses, one seminar module (independent of the course) and two modules must be completed. One module can be selected from business administration or engineering subjects and the other from business administration, economics, informatics, operations research, engineering, statistics, law or sociology.

The internship can be completed before or during the Bachelor's program. The performance record of the completed internship is required for registration for the final module examination in the course.

One is free to structure his/her individual course plan as he/she wishes (taking into account the respective provisions of the study and examination regulations as well as applicable module regulations) and choose the semester he/she wishes to start and/or complete the selected modules. It is however strongly recommended to adhere to the proposal for the first three semesters. The content of the courses is interdisciplinary and coordinated accordingly; the intersection freedom of lectures and examination dates is guaranteed for the recommended study semester.

All modules of the basic and advanced program, including the various alternatives within the module, can be found in this module handbook. Seminars that can be taken up as part of the seminar module are published at the WiWi portal at https://portal.wiwi.kit.edu/Seminare.
3 New study plan as of winter semester 2021/2022

For the winter semester 2021/2022, the basic program in the subjects business administration and mathematics has been changed. In the subject business administration, three modules, each worth 5 credit points, must be completed. In mathematics, the distribution of credit points for the three compulsory modules will change.
4 Qualification objectives of the Bachelor's degree in Industrial Engineering and Management

Graduates of the Bachelor's degree in Industrial Engineering and Management are equipped with strategically oriented knowledge in economics, engineering sciences, mathematics and information technology acquired during the three-semester core program.

The economics section includes business-related topics from the financial industry, company management, information industry, production management, marketing and accounting as well as economic correlations of microeconomics and macroeconomics.

The math section is divided into mathematics, statistics and operations research. It includes analysis and linear algebra, descriptive and inductive statistics, elementary probability theory and optimization methods.

In the engineering field, the focus is on material and energy balances, material characterization and development, engineering mechanics and electrical engineering.

The technological area is covered by the Applied and Theoretical Computer Science. Through the comprehensive methodological basis, the graduates are in a position to acknowledge and apply specialized basic concepts, methods, models and approaches. They are also able to analyze and review economic and technological structures and processes.

Graduates can independently solve basic engineering calculations and are able to apply important mathematical concepts and methods to solve concrete tasks.

The graduates have deeper knowledge in business administration, economics, computer science, operations research and engineering. Specialization is either done in the field of business administration or engineering depending on one's wishes. Additional knowledge in statistics, law or sociology is also offered depending on one's interests. They are able to react based on this knowledge from the different subjects and disciplines. They thereby largely operate independently in economic, technical and technological topics and survey, analyze, interpret and evaluate the situations systematically.

They are able to classify specialized problems as well as model and choose appropriate methods and procedures for solving the given tasks as well as derive improvement potentials. They know how to validate, illustrate and interpret the achieved results.

This practical use of their know-how also takes into account the social, scientific and ethical aspects.

Graduates of the Bachelor's degree in Industrial Engineering and Management master the basics of project management and are able to assume responsibility in interdisciplinary teams. They are in a position to argue and defend their position both before expert representatives and laypersons.

They have the ability to apply the acquired information on career-related activities in the industry, service sector or in the public management as well as take up a Master's degree program in Industrial Engineering and Management or any other related course.
5 Key Skills

The Bachelor's degree course in Industrial Engineering and Management at the Department of Economics and Management distinguishes itself by an exceptionally high level of interdisciplinarity. With the combination of business science, economics, informatics, operations research, mathematics as well as engineering and natural science, the integration of knowledge of different disciplines is an inherent element of the programme. As a result, interdisciplinary and connected thinking is encouraged in a natural way. The integrative taught key skills, which are acquired throughout the entire programme, can be classified into the following fields:

Soft skills

- Team work, social communication and creativity techniques
- Presentations and presentation techniques
- Logical and systematical arguing and writing
- Structured problem solving and communication

Enabling skills

- Decision making in business context
- Project management competences
- Fundamentals of business science
- English as a foreign language

Orientational knowledge

- Acquisition of interdisciplinary knowledge
- Institutional knowledge about economic and legal systems
- Knowledge about international organisations
- Media, technology and innovation

The integrative acquisition of key skills especially takes place in several compulsory courses during the bachelor programme, namely

- Basic programme in economics and business science
- Seminar module
- Mentoring of the bachelor thesis
- Internship
- Business science, economics and informatics modules
## 6 Field of study structure

<table>
<thead>
<tr>
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<tr>
<td>Preliminary Exam</td>
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</tr>
<tr>
<td>Bachelor's Thesis</td>
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<tr>
<td>Internship</td>
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</tr>
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<td>Informatics</td>
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<tr>
<td>Operations Research</td>
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<td>Engineering Sciences</td>
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</tr>
<tr>
<td>Mathematics</td>
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</tr>
<tr>
<td>Statistics</td>
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</tr>
<tr>
<td>Compulsory Elective Modules</td>
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### 6.1 Preliminary Exam

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### 6.2 Bachelor's Thesis

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### 6.3 Internship

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### 6.4 Business Administration

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<th>Credits</th>
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<tr>
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<td>M-WIWI-105769</td>
<td>Financing and Accounting</td>
<td>5 CR</td>
</tr>
<tr>
<td>M-WIWI-105770</td>
<td>Production, Logistics and Information Systems</td>
<td>5 CR</td>
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**Specialisation Program Business Administration (Election: at least 9 credits)**

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<tr>
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<th>Credits</th>
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<tr>
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<td>Management Accounting</td>
<td>9 CR</td>
</tr>
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<td>M-WIWI-101434</td>
<td>eBusiness and Service Management</td>
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<td>eFinance</td>
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<td>Energy Economics</td>
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<td>Essentials of Finance</td>
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<td>M-WIWI-101513</td>
<td>Human Resources and Organizations</td>
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<td>M-WIWI-101425</td>
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<td>M-WIWI-101465</td>
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<tr>
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<tr>
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### 6.5 Economics

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**Specialisation Program Economics (Election: at least 9 credits)**

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<td>Applied Microeconomics</td>
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<td>M-WIWI-101403</td>
<td>Public Finance</td>
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<tr>
<td>M-WIWI-101599</td>
<td>Statistics and Econometrics</td>
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<td>M-WIWI-105414</td>
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<td>M-WIWI-101668</td>
<td>Economic Policy I</td>
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</tr>
<tr>
<td>M-WIWI-101501</td>
<td>Economic Theory</td>
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### 6.6 Informatics

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**Specialisation Program Informatics (Election: at least 9 credits)**

<table>
<thead>
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<tr>
<td>M-WIWI-105112</td>
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## 6.7 Operations Research

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<tr>
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**Specialisation Program Operations Research (Election: 1 item)**

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<tr>
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<td>M-WIWI-101414 Methodical Foundations of OR</td>
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<td>M-WIWI-103278 Optimization under Uncertainty</td>
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## 6.8 Engineering Sciences

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<tbody>
<tr>
<td>M-ETIT-101155 Electrical Engineering</td>
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<td>M-MACH-101259 Engineering Mechanics</td>
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<td>M-WIWI-101839 Additional Fundamentals of Engineering</td>
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<tr>
<td>M-MACH-101260 Materials Science</td>
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**Specialisation Program Engineering Sciences (Election: at least 9 credits)**

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<tr>
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<td>M-WIWI-101404 Extracurricular Module in Engineering</td>
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<td>M-MACH-101274 Rail System Technology</td>
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<tr>
<td>M-WIWI-104838 Introduction to Natural Hazards and Risk Analysis</td>
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<tr>
<td>M-ETIT-102379 Power Network First usage possible until 9/30/2024.</td>
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<td>M-MACH-101264 Handling Characteristics of Motor Vehicles</td>
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<td>M-BGU-101067 Mobility and Infrastructure</td>
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<td>M-MACH-101275 Combustion Engines I</td>
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<td>M-MACH-101303 Combustion Engines II</td>
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<tr>
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<td>M-MACH-101262 Emphasis Materials Science</td>
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<tr>
<td>M-MACH-101286 Machine Tools and Industrial Handling</td>
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## 6.9 Mathematics

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### Credits: 21

## 6.10 Statistics

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### Credits: 10
Election notes
Within the scope of the elective compulsory area, the seminar module (independent of subject) and two modules are to be taken. One module must be chosen from the subjects Business Administration or Engineering Sciences, the other from the subjects Business Administration, Economics, Informatics, Operations Research, Engineering Sciences, Statistics, Law or Sociology.
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### Business Administration oder Engineering Sciences (Election: 9 credits)

#### Mandatory

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<td>M-MACH-101274</td>
<td>Rail System Technology</td>
<td>9 CR</td>
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<td>M-WIWI-101498</td>
<td>Management Accounting</td>
<td>9 CR</td>
</tr>
<tr>
<td>M-WIWI-101434</td>
<td>eBusiness and Service Management</td>
<td>9 CR</td>
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<td>M-WIWI-101402</td>
<td>eFinance</td>
<td>9 CR</td>
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<tr>
<td>M-WIWI-104838</td>
<td>Introduction to Natural Hazards and Risk Analysis</td>
<td>9 CR</td>
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### Economics (Elective: at most 9 credits)

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<td>M-WIWI-101499</td>
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<td>M-WIWI-101414</td>
<td>Methodical Foundations of OR</td>
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### Engineering Sciences (Elective: at most 9 credits)

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<td>Rail System Technology</td>
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<td>M-WIWI-104838</td>
<td>Introduction to Natural Hazards and Risk Analysis</td>
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7 Modules

### 7.1 Module: Additional Fundamentals of Engineering [M-WIWI-101839]

**Responsible:** Prof. Dr.-Ing. Alexander Fidlin
PD Dr. Volker Gaukel
Prof. Dr. Michael Hoffmann

**Organisation:** KIT Department of Economics and Management

**Part of:** Engineering Sciences (mandatory)

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**Compulsory Elective Courses (Election: between 3 and 5 credits)**

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<td>Material Science II for Business Engineers</td>
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<td>T-MACH-102210</td>
<td>Introduction to Engineering Mechanics II: Dynamics</td>
<td>5 CR</td>
<td>Fidlin</td>
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<td>T-CIWVT-106058</td>
<td>Process Fundamentals by the Example of Food Production</td>
<td>3 CR</td>
<td>Gaukel</td>
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<td>T-ETIT-100534</td>
<td>Electrical Engineering for Business Engineers, Part II</td>
<td>5 CR</td>
<td>Menesklou</td>
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</table>

**Competence Certificate**
See course description.

**Prerequisites**
None

**Competence Goal**
See German version.

**Content**
The module focuses on basic engineering topics related to materials science, engineering mechanics and food processing.

**Annotation**
The course T-ETIT-100534 “Electrical Engineering for Business Engineers, Part II” is only offered temporarily in the module. It should be pointed out that “Material Science II for Business Engineers” and “Electrical Engineering for Business Engineers, Part II” are not offered in winter term, but only in summer term.

**Workload**
The total workload for this module is approximately 90 hours.
7.2 Module: Advanced Macroeconomics [M-WIWI-106472]

**Responsible:** Prof. Dr. Johannes Brumm

**Organisation:** KIT Department of Economics and Management

**Part of:**
- Economics (Specialisation Program Economics)
- Compulsory Elective Modules (Economics)

<table>
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<td>4,5 CR</td>
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<td>T-WIWI-109121</td>
<td>Macroeconomic Theory</td>
<td>4,5 CR</td>
<td>Brumm</td>
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**Competence Certificate**

The module examination is carried out in the form of partial examinations of the courses of the module. The assessment procedures of each course of this module is defined for each course separately.

**Competence Goal**

The student

- acquires knowledge of modern macroeconomic models
- is able to analyze and discuss fiscal and monetary policy issues
- understands algorithms for solving dynamic, stochastic models
- is able to apply learned numerical methods independently

**Content**

The module focuses on teaching both theoretical foundations and solution procedures for macroeconomic models.

**Annotation**

The two courses can be taken in any order. They complement each other, but do not build on each other.

**Workload**

The total workload for this module is approximately 270 hours. The exact distribution is made according to the credit points of the courses of the module.
7.3 Module: Applications of Operations Research [M-WIWI-101413]

- **Responsible:** Prof. Dr. Stefan Nickel
- **Organisation:** KIT Department of Economics and Management
- **Part of:** Operations Research (Specialisation Program Operations Research)

### Compulsory Elective Courses (Elective: between 1 and 2 items)

<table>
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<td>T-WIWI-102714</td>
<td>Tactical and Operational Supply Chain Management</td>
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### Supplementary Courses (Elective: at most 1 item)

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<td>T-WIWI-106199</td>
<td>Modeling and OR-Software: Introduction</td>
<td>4.5 CR</td>
<td>Nickel</td>
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<tr>
<td>T-WIWI-106545</td>
<td>Optimization under Uncertainty</td>
<td>4.5 CR</td>
<td>Rebennack</td>
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### Competence Certificate

The assessment is carried out as partial exams (according to § 4(2), 1 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module.

The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

### Prerequisites

At least one of the courses Facility Location and strategic Supply Chain Management and Tactical and operational Supply Chain Management has to be taken.

### Competence Goal

The student

- is familiar with basic concepts and terms of Supply Chain Management,
- knows the different areas of Supply Chain Management and their respective optimization problems,
- is acquainted with classical location problem models (in the plane, on networks and discrete) as well as fundamental methods for distribution and transport planning, inventory planning and management,
- is able to model practical problems mathematically and estimate their complexity as well as choose and adapt appropriate solution methods.

### Content

Supply Chain Management is concerned with the planning and optimization of the entire, inter-company procurement, production and distribution process for several products taking place between different business partners (suppliers, logistics service providers, dealers). The main goal is to minimize the overall costs while taking into account several constraints including the satisfaction of customer demands.

This module considers several areas of Supply Chain Management. On the one hand, the determination of optimal locations within a supply chain is addressed. Strategic decisions concerning the location of facilities like production plants, distribution centers or warehouses are of high importance for the rentability of supply chains. Thoroughly carried out, location planning tasks allow an efficient flow of materials and lead to lower costs and increased customer service. On the other hand, the planning of material transport in the context of Supply Chain Management represents another focus of this module. By linking transport connections and different facilities, the material source (production plant) is connected with the material sink (customer). For given material flows or shipments, it is considered how to choose the optimal (in terms of minimal costs) distribution and transportation chain from the set of possible logistics chains, which asserts the compliance of delivery times and further constraints.

Furthermore, this module offers the possibility to learn about different aspects of the tactical and operational planning level in Supply Chain Management, including methods of scheduling as well as different approaches in procurement and distribution logistics. Finally, issues of warehousing and inventory management will be discussed.

### Annotation

The planned lectures and courses for the next three years are announced online.
Workload
The total workload of the module is about 240 hours. The workload is proportional to the credit points of the individual courses.

Recommendation
The courses Introduction to Operations Research I and II are helpful.
7.4 Module: Applied Informatics [M-WIWI-105112]

**Responsible:**
Dr.-Ing. Michael Färber  
Prof. Dr. Andreas Oberweis  
Prof. Dr. Ali Sunyaev  
Prof. Dr. Melanie Volkamer

**Organisation:**  
KIT Department of Economics and Management

**Part of:**  
Informatics (Specialisation Program Informatics)

<table>
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**Advanced Programming (Election: 1 item)**
- T-WIWI-102747 Advanced Programming - Java Network Programming 4,5 CR Ratz, Zöllner
- T-WIWI-102748 Advanced Programming - Application of Business Software 4,5 CR Klink, Oberweis

**Compulsory Elective Area (Election: 1 item)**
- T-WIWI-110340 Applied Informatics – Applications of Artificial Intelligence 4,5 CR Färber
- T-WIWI-110341 Applied Informatics – Database Systems 4,5 CR Oberweis
- T-WIWI-110342 Applied Informatics – Information Security 4,5 CR Volkamer
- T-WIWI-110338 Applied Informatics – Modelling 4,5 CR Färber, Oberweis
- T-WIWI-110343 Applied Informatics – Software Engineering 4,5 CR Oberweis

**Competence Certificate**
The assessment is carried out as two partial exams (according to Section 4(2) of the examination regulation) of the single courses of this module. For passing the module exam in every singled partial exam the respective minimum requirements has to be achieved.
- Partial exam I: Advanced Programming - Java Network Programming or alternatively Advanced Programming - Application of Business Software
- Partial exam II: all the rest

The examinations are offered every semester. Re-examinations are offered at every ordinary examination date. The assessment procedures are described for each course of the module separately.

When every singled examination is passed, the overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

**Competence Goal**
The student
- has the capability of dealing with the practical application of the Java programming language (which is the dominating programming language in many application areas) or alternatively the ability to configure, parameterize and deploy enterprise software to enable, support and automate business processes,
- knows in depth methods and systems of a core area or a core application area of Informatics according to the contents dealt with in the lectures,
- can choose these methods and system situation adequately and can furthermore design and employ them for problem solving,
- is able to independently find strategic and creative answers in the finding of solutions to well defined, concrete, and abstract problems.

**Content**
In this module, object-oriented programming skills using the Java programming language are further deepened. Alternatively important fundamentals of business information systems are conveyed that enable, support and accelerate new forms of business processes and organizational forms. Based on a core application area, basic methods and techniques of computer science are presented.

**Workload**
The total workload for this module is approximately 270 hours. For further information see German version.
### 7.5 Module: Applied Microeconomics [M-WIWI-101499]

**Responsible:** Prof. Dr. Johannes Philipp Reiß  
**Organisation:** KIT Department of Economics and Management  
**Part of:** Economics (Specialisation Program Economics)  
**Compulsory Elective Modules (Economics)**

<table>
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#### Compulsory Elective Courses (Election: at least 9 credits)

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<tr>
<td>T-WIWI-102876</td>
<td>Auction &amp; Mechanism Design</td>
<td>4,5 CR</td>
<td>Szech</td>
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<tr>
<td>T-WIWI-112228</td>
<td>Digital Markets and Market Design</td>
<td>4,5 CR</td>
<td>Hillenbrand</td>
</tr>
<tr>
<td>T-WIWI-102892</td>
<td>Economics and Behavior</td>
<td>4,5 CR</td>
<td>Szech</td>
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<tr>
<td>T-WIWI-102850</td>
<td>Introduction to Game Theory</td>
<td>4,5 CR</td>
<td>Puppe, Reiß</td>
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<td>T-WIWI-102792</td>
<td>Decision Theory</td>
<td>4,5 CR</td>
<td>Ehrhart</td>
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<tr>
<td>T-WIWI-102844</td>
<td>Industrial Organization</td>
<td>4,5 CR</td>
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<td>T-WIWI-102739</td>
<td>Public Revenues</td>
<td>4,5 CR</td>
<td>Wigger</td>
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<td>T-WIWI-102736</td>
<td>Economics III: Introduction in Econometrics</td>
<td>5 CR</td>
<td>Schienle</td>
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<tr>
<td>T-WIWI-100005</td>
<td>Competition in Networks</td>
<td>4,5 CR</td>
<td>Mitusch</td>
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#### Competence Certificate

The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

#### Competence Goal

**Students**

- are introduced to the basic theoretical analysis of strategic interaction situations and shall be able to analyze situations of strategic interaction systematically and to use game theory to predict outcomes and give advice in applied economics settings. (course “Introduction to Game Theory”);
- are exposed to the basic problems of imperfect competition and its implications for policy making; (course “Industrial Organization”);
- are provided with the basic economics of network industries (e.g., telecom, utilities, IT, and transport sectors) and should get a vivid idea of the special characteristics of network industries concerning planning, competition, competitive distortion, and state intervention, (course “Competition in Networks”).

#### Content

The module’s purpose is to extend and foster skills in microeconomic theory by investigating a variety of applications. Students shall be able to analyze real-life problems using microeconomics.

#### Workload

The total workload for this module is approximately 270 hours. For further information see German version.

#### Recommendation

Completion of the module Economics is strongly recommended.
7.6 Module: Automotive Engineering [M-MACH-101266]

**Responsibility:** Prof. Dr. Frank Gauterin

**Organisation:** KIT Department of Mechanical Engineering

**Part of:**
- Engineering Sciences (Specialisation Program Engineering Sciences)
- Compulsory Elective Modules (Business Administration oder Engineering Sciences)
- Compulsory Elective Modules (Engineering Sciences)

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**Automotive Engineering (Election: at least 9 credits)**

- **T-MACH-102203** Automotive Engineering I
  - 6 CR Gauterin, Gießler
- **T-MACH-112126** Data-Driven Algorithms in Vehicle Technology
  - 4 CR Scheubner
- **T-MACH-102093** Fluid Power Systems
  - 5 CR Geimer
- **T-MACH-100092** Automotive Engineering I
  - 6 CR Gauterin, Gießler
- **T-MACH-102117** Automotive Engineering II
  - 3 CR Gauterin, Gießler
- **T-MACH-102116** Fundamentals for Design of Motor-Vehicle Bodies I
  - 1.5 CR Bardehle
- **T-MACH-102119** Fundamentals for Design of Motor-Vehicle Bodies II
  - 1.5 CR Bardehle
- **T-MACH-110796** Python Algorithm for Vehicle Technology
  - 4 CR Rhode
- **T-MACH-102156** Project Workshop: Automotive Engineering
  - 4.5 CR Frey, Gauterin, Gießler
- **T-MACH-111820** Control of Mobile Machines – Prerequisites
  - 0 CR Becker, Geimer
- **T-MACH-111821** Control of Mobile Machines
  - 4 CR Becker, Geimer

**Competence Certificate**
The assessment is carried out as partial exams.

The partial exams consists of a written exam (90 to 120 minutes) or an oral exam (duration 30 to 40 minutes).

**Prerequisites**
None

**Competence Goal**
The student
- knows the most important components of a vehicle,
- knows and understands the functioning and the interaction of the individual components,
- knows the basics of dimensioning the components.

**Content**
In the module Automotive Engineering the basics are taught, which are important for the development, the design, the production and the operation of vehicles. Particularly the primary important aggregates like engine, gear, drive train, chasis and auxiliary equipment are explained, but also all technical equipment, which make the operation safer and easier. Additionally the interior equipment is examined, which shall provide a preferably comfortable, optimum ambience to the user.

In the module Automotive Engineering the focus is on passenger cars and commercial vehicles, which are designed for road applications.

**Workload**
The total work load for this module is about 270 Hours (9 Credits). The partition of the work load is carried out according to the credit points of the courses of the module. The work load for courses with 6 credit points is about 180 hours, for courses with 4.5 credit points about 135 hours, for courses with 3 credit points about 90 hours, and for courses with 1.5 credit points about 45 hours. The total number of hours per course results from the time of visiting the lectures and exercises, as well as from the exam duration and the time that is required to achieve the objectives of the module as an average student with an average performance.

**Recommendation**
Learning type
The teaching and learning procedures (lecture, lab course, workshop) are described for each course of the module separately.
### 7.7 Module: Combustion Engines I [M-MACH-101275]

**Responsible:** Prof. Dr. Thomas Koch  
Dr.-Ing. Heiko Kubach  

**Organisation:** KIT Department of Mechanical Engineering

**Part of:**  
- Engineering Sciences (Specialisation Program Engineering Sciences)  
- Compulsory Elective Modules (Business Administration oder Engineering Sciences)  
- Compulsory Elective Modules (Engineering Sciences)

<table>
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**Wahlpflicht (Election: between 1 and 2 items)**

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<th>Tutor</th>
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<tbody>
<tr>
<td>T-MACH-111550</td>
<td>CO2-Neutral Combustion Engines and their Fuels I</td>
<td>5</td>
<td>Koch</td>
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<tr>
<td>T-MACH-111585</td>
<td>Hydrogen and reFuels - Energy Conversion in Combustion Engines</td>
<td>4</td>
<td>Kubach</td>
</tr>
</tbody>
</table>

**Competence Certificate**

The module examination contains of two oral examinations. The module score results from the two scores weighted according to the ECTS.

**Prerequisites**

None

**Competence Goal**

The student can name and explain the working principle of combustion engines. He is able to analyse and evaluate the combustion process. He is able to evaluate influences of gas exchange, mixture formation, fuels and exhaust gas aftertreatment on the combustion performance. He can solve basic research problems in the field of engine development.

The student can name all important influences on the combustion process. He can analyse and evaluate the engine process considering efficiency, emissions and potential.

**Content**

- Working Principle of ICE  
- Characteristic Parameters  
- Characteristic parameters  
- Engine parts  
- Crank drive  
- Fuels  
- Gasolien engine operation modes  
- Diesel engine operation modes  
- Emissions  
- Fundamentals of ICE combustion  
- Thermodynamics of ICE  
- Flow field  
- Wall heat losses  
- Combustion in Gasoline and Diesel engines  
- Heat release calculation  
- Waste heat recovery  
- CO2-free engine technology

**Workload**

- regular attendance: 62 hours  
- self-study: 208 hours
## 7.8 Module: Combustion Engines II [M-MACH-101303]

**Responsible:** Dr.-Ing. Heiko Kubach  
Julia Reichel  

**Organisation:** KIT Department of Mechanical Engineering

**Part of:**  
- Engineering Sciences (Specialisation Program Engineering Sciences)  
- Compulsory Elective Modules (Business Administration oder Engineering Sciences)  
- Compulsory Elective Modules (Engineering Sciences)

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### Mandatory

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<td>T-MACH-111560</td>
<td>CO2-Neutral Combustion Engines and their Fuels II</td>
<td>5 CR</td>
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<tr>
<td>T-MACH-105173</td>
<td>Analysis of Exhaust Gas and Lubricating Oil in Combustion Engines</td>
<td>4 CR</td>
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<tr>
<td>T-MACH-105649</td>
<td>Boosting of Combustion Engines</td>
<td>4 CR</td>
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<tr>
<td>T-MACH-105184</td>
<td>Fuels and Lubricants for Combustion Engines</td>
<td>4 CR</td>
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<tr>
<td>T-MACH-110817</td>
<td>Development of Hybrid Drivetrains</td>
<td>4 CR</td>
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<tr>
<td>T-MACH-110816</td>
<td>Großdiesel- und -gasmotoren für Schiffsantriebe</td>
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<tr>
<td>T-MACH-105044</td>
<td>Fundamentals of Catalytic Exhaust Gas Aftertreatment</td>
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<td>T-MACH-105167</td>
<td>Analysis Tools for Combustion Diagnostics</td>
<td>4 CR</td>
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<tr>
<td>T-MACH-105169</td>
<td>Engine Measurement Techniques</td>
<td>4 CR</td>
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<td>T-MACH-111578</td>
<td>Sustainable Vehicle Drivetrains</td>
<td>4 CR</td>
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<tr>
<td>T-MACH-105985</td>
<td>Ignition Systems</td>
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**Competence Certificate**

The assessment consists of an oral exam (60 min) taking place in the recess period (according to §4 (2), 2 of the examination regulation). The exam takes place in every semester. Reexaminations are offered at every ordinary examination date.

**Prerequisites**

- It is only possible to choose this module in combination with the module Combustion Engines I. The module is passed only after the final partial exam of Combustion Engines I is additionally passed.
- The course Combustion Engines II [2134131] has to be attended.

**Competence Goal**

See courses.

**Content**

**Compulsory:**
- Supercharging and air management
- Engine maps
- Emissions and Exhaust gas aftertreatment
- Transient engine operation
- ECU application
- Electrification and alternative powertrains

**Elective:**
- Fuels and lubricants for ICE
- Fundamentals of catalytic EGA
- Analysis tools for combustion diagnostics
- Engine measurement techniques
- Analysis of Exhaust Gas and Lubricating Oil in Combustion Engines
Workload
regular attendance: 62 h
self-study: 208 h

Learning type
Lecture, Tutorial
### 7.9 Module: Control Engineering [M-ETIT-101156]

**Responsible:** Prof. Dr.-Ing. Sören Hohmann  
Dr.-Ing. Mathias Kluwe

**Organisation:** KIT Department of Electrical Engineering and Information Technology

**Part of:**  
- Engineering Sciences (Specialisation Program Engineering Sciences) (Usage until 9/30/2024)  
- Compulsory Elective Modules (Business Administration oder Engineering Sciences) (Usage until 9/30/2024)  
- Compulsory Elective Modules (Engineering Sciences) (Usage until 9/30/2024)

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<td>T-ETIT-101921</td>
<td>System Dynamics and Control Engineering</td>
<td>6 CR</td>
<td>Hohmann</td>
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<td>T-ETIT-109285</td>
<td>Complex Analysis and Integral Transformations</td>
<td>4 CR</td>
<td>Kluwe</td>
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**Prerequisites**

none
7.10 Module: eBusiness and Service Management [M-WIWI-101434]

**Responsible:** Prof. Dr. Christof Weinhardt

**Organisation:** KIT Department of Economics and Management

**Part of:**
- Business Administration (Specialisation Program Business Administration)
- Compulsory Elective Modules (Business Administration oder Engineering Sciences)
- Compulsory Elective Modules (Business Administration)

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### Compulsory Elective Courses (Election: 9 credits)

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<tr>
<td>T-WIWI-111307</td>
<td>Digital Services: Foundations</td>
<td>4.5 CR</td>
<td>Satzger, Vössing</td>
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<tr>
<td>T-WIWI-110797</td>
<td>eFinance: Information Systems for Securities Trading</td>
<td>4.5 CR</td>
<td>Weinhardt</td>
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<tr>
<td>T-WIWI-109816</td>
<td>Foundations of Interactive Systems</td>
<td>4.5 CR</td>
<td>Mädeh</td>
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<td>T-WIWI-107506</td>
<td>Platform Economy</td>
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<td>Weinhardt</td>
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<tr>
<td>T-WIWI-109940</td>
<td>Special Topics in Information Systems</td>
<td>4.5 CR</td>
<td>Weinhardt</td>
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### Competence Certificate

The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

### Prerequisites

None

### Competence Goal

The students

- understand the strategic and operative design of information and information products,
- analyze the role of information on markets,
- evaluate case studies regarding information products,
- develop solutions in teams.

### Content

This module gives an overview of the mutual dependencies of strategic management and information systems. The central role of information is exemplified by the structuring concept of the information life cycle.

The single phases of this life cycle from generation over allocation until dissemination and use of the information are analyzed from a business and microeconomic perspective, applying classical and new theories. The state of the art of economic theory on aspects of the information life cycle are presented. The lecture is complemented by exercise courses. The courses "Platform Economy", "eFinance: Information systems in finance" and "eServices" constitute three different application domains in which the basic principles of the Internet Economy are deepened. In the core lecture "Platform Economy" the focus is set on markets between two parties that act through an intermediary on an Internet platform. Topics discussed are network effects, peer-to-peer markets, blockchains and marketdesign. The course is held in English and teaches parts of the syllabus with the support of a case study in which students analyze a platform.

The course "eFinance: information systems for securities trading" provides theoretically profound and also practical-oriented background about the functioning of international financial markets. The focus is placed on the economic and technical design of markets as information processing systems.

In "eServices" the increasing impact of electronic services compared to the traditional services is outlined. The Information- and Communication Technologies enable the provision of services, which are mainly characterized by interactivity and individuality. This course provides basic knowledge about the development and management of ICT-based services.

The theoretic fundamentals of Information systems can be enriched by a practical experience in Special Topics in Information Engineering and Management. Any practical Seminar at the IM can be chosen for the course Special Topics in Information systems.
Annotation
All practical Seminars offered at the IM can be chosen for Special Topics in Information Systems. Please update yourself on www.iism.kit.edu/im/lehre

Workload
The total workload of the module is about 240 hours. The workload is proportional to the credit points of the individual courses.
Module: Economic Policy I [M-WIWI-101668]

- **Responsible:** Prof. Dr. Ingrid Ott
- **Organisation:** KIT Department of Economics and Management
- **Part of:**
  - Economics (Specialisation Program Economics)
  - Compulsory Elective Modules (Economics)

### Credits
- **9**

### Grading scale
- Grade to a tenth

### Recurrence
- Each term

### Duration
- 1 term

### Language
- German

### Level
- 3

### Version
- 9

#### Mandatory

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Grading</th>
<th>Recurrence</th>
<th>Language</th>
<th>Level</th>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>T-WIWI-103213</td>
<td>Basic Principles of Economic Policy</td>
<td>4,5</td>
<td>CR</td>
<td>Each term</td>
<td></td>
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#### Compulsory Elective Courses (Election: 1 item)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Grading</th>
<th>Recurrence</th>
<th>Language</th>
<th>Level</th>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>T-WIWI-109121</td>
<td>Macroeconomic Theory</td>
<td>4,5</td>
<td>CR</td>
<td>Each term</td>
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<tr>
<td>T-WIWI-102739</td>
<td>Public Revenues</td>
<td>4,5</td>
<td>CR</td>
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<td>T-WIWI-102908</td>
<td>Personnel Policies and Labor Market Institutions</td>
<td>4,5</td>
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<td>T-WIWI-100005</td>
<td>Competition in Networks</td>
<td>4,5</td>
<td>CR</td>
<td>Each term</td>
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</tbody>
</table>

#### Competence Certificate

The module examination takes place in the form of examinations (§4(2),1 SPO) of the selected partial module performance. The examination is carried out separately for each partial module and is described there. It is possible to repeat examinations at any regular examination date.

The grades of the partial module correspond to the grades of the passed examinations. The overall grade of the module is formed from the grades of the partial performances weighted with LP.

#### Prerequisites

The course "Introduction to Economic Policy" is mandatory in the module.

#### Competence Goal

Students shall be given the ability to
- understand and deepen basic concepts of micro- and macroeconomic theories
- apply those theories to economic policy issues
- understand government interventions in the market and their legitimisation from the perspective of economic welfare
- learn how theory-based policy recommendations are derived

#### Content

- Intervention in the market: micro-economic perspective
- Intervention in the market: macroeconomic perspective
- Institutional economic aspects
- Economic policy and welfare economics
- Carriers of economic policy: political-economic aspects

#### Workload

Total effort for 9 credit points: approx. 270 hours. The distribution is made according to the credit points of the courses of the module.

#### Recommendation

Basic knowledge of micro- and macroeconomics is strongly recommended, as taught in the courses Economics I [2610012], and Economics II [2600014].
7.12 Module: Economic Theory [M-WIWI-101501]

**Responsible:** Prof. Dr. Clemens Puppe

**Organisation:** KIT Department of Economics and Management

**Part of:** Economics (Specialisation Program Economics)

**Compulsory Elective Modules (Economics)**

<table>
<thead>
<tr>
<th>Credits</th>
<th>Grading scale</th>
<th>Recurrence</th>
<th>Duration</th>
<th>Language</th>
<th>Level</th>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
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<td>Each term</td>
<td>2 terms</td>
<td>German/English</td>
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**Compulsory Elective Courses (Election: 9 credits)**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Responsible</th>
</tr>
</thead>
<tbody>
<tr>
<td>T-WIWI-102609</td>
<td>Advanced Topics in Economic Theory</td>
<td>4.5 CR</td>
<td>Mitusch</td>
</tr>
<tr>
<td>T-WIWI-102876</td>
<td>Auction &amp; Mechanism Design</td>
<td>4.5 CR</td>
<td>Szech</td>
</tr>
<tr>
<td>T-WIWI-102892</td>
<td>Economics and Behavior</td>
<td>4.5 CR</td>
<td>Szech</td>
</tr>
<tr>
<td>T-WIWI-102850</td>
<td>Introduction to Game Theory</td>
<td>4.5 CR</td>
<td>Puppe, Reiß</td>
</tr>
<tr>
<td>T-WIWI-102844</td>
<td>Industrial Organization</td>
<td>4.5 CR</td>
<td>Reiß</td>
</tr>
<tr>
<td>T-WIWI-109121</td>
<td>Macroeconomic Theory</td>
<td>4.5 CR</td>
<td>Brumm</td>
</tr>
<tr>
<td>T-WIWI-102610</td>
<td>Welfare Economics</td>
<td>4.5 CR</td>
<td>Puppe</td>
</tr>
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</table>

**Competence Certificate**

The assessment is carried out as partial exams (according to Section 4(2), 1 or 2 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

**Prerequisites**

None

**Competence Goal**

Students will
- master concepts that are central to (micro-)economic theory and are familiar with their real-world applications,
- will be able to interpret and critically assess microeconomic models,
- attain in-depth knowledge of the theory of strategic decision making and of general equilibrium models,
- can apply methods from welfare economics to analyze issues like distributional fairness and equality of opportunity.

**Content**

The module covers central concepts in microeconomic theory as well as their applications. This includes an in-depth introduction to the modelling language and the equilibrium concepts (Nash equilibrium, sub-game-perfect Nash equilibrium, etc.) of non-cooperative game theory ("Introduction to Game Theory") as well as its applications to problems of imperfect competition and industrial organization ("Industriëkonomie") and the design of auctions and (incentive-)mechanisms ("Auction & Mechanism Design").

A further focus of the module is on the development of a micro-founded general equilibrium model in order to examine key macroeconomic issues such as public debt and labor market as well as monetary policies ("Macroeconomic Theory"). Students may also delve deeper into the basics of behavioral economics and experimental design ("Economics & Behavior") as well as into questions of equality of opportunity and the fairness and efficiency of economic allocations ("Wohlfahrtstheorie").

**Annotation**

Please note that the course T-WIWI-102609 "Advanced Topics in Economic Theory" is currently not available.

**Workload**

The total workload for this module is approximately 270 hours (9 credit points). The distribution is done according to the credit points of the courses of the module. The workload for courses with 4.5 credit points is approx. 135 hours. The total number of hours per course is calculated from the time required for attending lectures and exercises, as well as examination times and the time required for an average student to achieve the learning objectives of the module.

**Recommendation**

None
7.13 Module: eFinance [M-WIWI-101402]

**Mandatory**

<table>
<thead>
<tr>
<th>Credits</th>
<th>Grading scale</th>
<th>Recurrence</th>
<th>Duration</th>
<th>Language</th>
<th>Level</th>
<th>Version</th>
</tr>
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<tbody>
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<td></td>
<td>3</td>
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<tr>
<td>T-WIWI-110797</td>
<td>eFinance: Information Systems for Securities Trading</td>
<td>4.5 CR</td>
<td>Weinhardt</td>
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**Supplementary Courses (Election: at least 4,5 credits)**

<table>
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<tr>
<th>Credits</th>
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<th>Recurrence</th>
<th>Duration</th>
<th>Language</th>
<th>Level</th>
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<tr>
<td>T-WIWI-102643</td>
<td>Derivatives</td>
<td>4.5 CR</td>
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<tr>
<td>T-WIWI-112694</td>
<td>FinTech</td>
<td>4.5 CR</td>
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<tr>
<td>T-WIWI-102646</td>
<td>International Finance</td>
<td>3 CR</td>
<td>Uhrig-Homburg</td>
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</table>

**Competence Certificate**
The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the core course and further single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

**Prerequisites**
The course eFinance: Information Systems for Securities Trading [2540454] is compulsory and must be examined.

**Competence Goal**
The students

- are able to understand and analyse the value creation chain in stock broking,
- are able to adequately identify, design and use methods and systems to solve problems in finance,
- are able to evaluate and criticize investment decisions by traders,
- are able to apply theoretical methods of econometrics,
- learn to elaborate solutions in a team.

**Content**
The module "eFinance" addresses current problems in the finance sector. It is investigated the role of information and knowledge in the finance sector and how information systems can solve or extend them. Speakers from practice will contribute to lectures with their broad knowledge. Core courses of the module deal with the background of banks and insurance companies and the electronic commerce of stocks in global finance markets. In addition the course Derivatives offers an insight into future and forward contracts as well as the assessment of options. Exchanges and International Finance are also alternatives which provide a supplementary understanding for capital markets.

Information management topics are the focus of the lecture "eFinance: Information Systems for Securities Trading". For the functioning of the international finance markets, it is necessary that there is an efficient information flow. Also, the regulatory frameworks play an important role. In this context, the role and the functioning of (electronic) stock markets, online brokers and other finance intermediaries and their platforms are presented. Not only IT concepts of German finance intermediaries are presented, but also international system approaches will be compared. The lecture is supplemented by speakers from the practice (and excursions, if possible) coming from the Deutsche Börse and the Stuttgart Stock Exchange.

**Annotation**
The current seminar courses for this semester, which are complementary to this module, are listed on following webpage: the http://www.iism.kit.edu/im/lehre

**Workload**
The total workload of the module is about 240 hours. The workload is proportional to the credit points of the individual courses.
7.14 Module: Electives in Informatics [M-WIWI-101426]

**Responsibility:**
Dr.-Ing. Michael Färber  
Prof. Dr. Andreas Oberweis  
Prof. Dr. Ali Sunyaev  
Prof. Dr. Melanie Volkamer

**Organisation:**
KIT Department of Economics and Management

**Part of:**
Compulsory Elective Modules (Informatics)

**Credits:** 9  
**Grading scale:** Grade to a tenth  
**Recurrence:** Each term  
**Duration:** 1 term  
**Level:** 3  
**Version:** 12

| Compulsory Elective Area (Election: between 1 and 2 items) |  
|------------------------------------------------------------|---|
| T-WIWI-110340 Applied Informatics – Applications of Artificial Intelligence | 4.5 CR Färber |
| T-WIWI-110341 Applied Informatics – Database Systems | 4.5 CR Oberweis |
| T-WIWI-110342 Applied Informatics – Information Security | 4.5 CR Volkamer |
| T-WIWI-110338 Applied Informatics – Modelling | 4.5 CR Färber, Oberweis |
| T-WIWI-110343 Applied Informatics – Software Engineering | 4.5 CR Oberweis |
| T-WIWI-110711 Supplement Applied Informatics | 4.5 CR Professorenschaft des Instituts AIFB |
| T-WIWI-104679 Foundations of Mobile Business | 4.5 CR Oberweis |

**Advanced Labs (Election: at most 1 item)**

| T-WIWI-111127 Advanced Lab Blockchain Hackathon (Bachelor) | 4.5 CR Sunyaev |
| T-WIWI-111124 Advanced Lab Sociotechnical Information Systems Development (Bachelor) | 4.5 CR Sunyaev |
| T-WIWI-110541 Advanced Lab Informatics (Bachelor) | 4.5 CR Professorenschaft des Instituts AIFB |
| T-WIWI-112915 Advanced Lab Realization of Innovative Services (Bachelor) | 4.5 CR Oberweis |
| T-WIWI-108439 Advanced Lab Security, Usability and Society | 4.5 CR Volkamer |

**Competence Certificate**
The assessment is carried out as two partial exams (according to Section 4(2) of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. For passing the module exam in every single partial exam the respective minimum requirements has to be achieved.

The examinations are offered every semester. Re-examinations are offered at every ordinary examination date. The assessment procedures are described for each course of the module separately.

When every singled examination is passed, the overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

**Prerequisites**
None

**Competence Goal**
The student
- knows and has mastered methods and systems for core topics and core application areas of computer science,
- can choose these methods and system situation adequately and can furthermore design and employ them for problem solving,
- is able to independently find strategic and creative answers in the finding of solutions to well defined, concrete, and abstract problems.

**Content**
The elective module conveys advanced knowledge in the area of applied computer science. This includes, for example, the efficient design and optimization of technical systems, the design and management of database applications or the systematic development of large software systems. Moreover, modeling of complex systems, the use of computer science methods to support knowledge management, and the design and implementation of service-oriented architectures are discussed in this module.
**Workload**
The total workload for this module is approximately 270 hours. For further information see German version.
### 7.15 Module: Electrical Engineering [M-ETIT-101155]

**Responsible:** Dr. Wolfgang Menesklou  
**Organisation:** KIT Department of Electrical Engineering and Information Technology  
**Part of:** Engineering Sciences (mandatory)

<table>
<thead>
<tr>
<th>Credits</th>
<th>Grading scale</th>
<th>Recurrence</th>
<th>Duration</th>
<th>Level</th>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Grade to a tenth</td>
<td>Each winter term</td>
<td>1 term</td>
<td>3</td>
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<table>
<thead>
<tr>
<th>Mandatory</th>
</tr>
</thead>
<tbody>
<tr>
<td>T-ETIT-100533</td>
</tr>
</tbody>
</table>

**Competence Certificate**  
The assessment takes place in the form of a written examination lasting 2 hours.

**Competence Goal**  
The student knows and understands basic terms of electrical engineering and should be able to carry out simple calculations of DC and AC circuits.

**Content**  
Supporting the lecture, assignments to the curriculum are distributed. These are solved into additional (voluntary) tutorials.

**Module grade calculation**  
The module grade is the grade of the written exam.

**Workload**  
See German version.
7.16 Module: Emphasis in Fundamentals of Engineering [M-MACH-101261]

**Responsible:** Prof. Dr. Michael Hoffmann

**Organisation:** KIT Department of Mechanical Engineering

**Part of:**
- Engineering Sciences (Specialisation Program Engineering Sciences)
- Compulsory Elective Modules (Business Administration oder Engineering Sciences)
- Compulsory Elective Modules (Engineering Sciences)

<table>
<thead>
<tr>
<th>Credits</th>
<th>Grading scale</th>
<th>Recurrence</th>
<th>Duration</th>
<th>Level</th>
<th>Version</th>
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<tbody>
<tr>
<td>9</td>
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<td>Each term</td>
<td>1 term</td>
<td>4</td>
<td>2</td>
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**Specialization in Fundamentals of Engineering (Election: at least 9 credits)**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>CR</th>
<th>Instructor</th>
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</thead>
<tbody>
<tr>
<td>T-ETIT-100534</td>
<td>Electrical Engineering for Business Engineers, Part II</td>
<td>5 CR</td>
<td>Meneskou</td>
</tr>
<tr>
<td>T-MACH-102079</td>
<td>Material Science II for Business Engineers</td>
<td>5 CR</td>
<td>Hoffmann</td>
</tr>
<tr>
<td>T-MACH-102210</td>
<td>Introduction to Engineering Mechanics II : Dynamics</td>
<td>5 CR</td>
<td>Fidlin</td>
</tr>
</tbody>
</table>

**Competence Certificate**
The assessment is carried out as partial exams (according to Section 4(2), 1 or 2 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The examinations take place at the beginning of the recess period. Re-examinations are offered at every ordinary examination date. The assessment procedures are described for each course of the module separately.

The overall grade of the module is removed from the average of the partial examinations, with at least two partial exams need to be.

**Competence Goal**
Students acquire and deepen skills in engineering fundamentals and can apply them to technical problems. Specific teaching objectives are agreed with the respective coordinator of the course.

**Content**
The module content depends on the elected courses.

**Annotation**
Starting winter term 2016/1017 the course "Introduction to Engineering Mechanics II : Dynamics" [2162276] will be held in winter term.

**Workload**
See German version.
7.17 Module: Emphasis Materials Science [M-MACH-101262]

Responsible: Prof. Dr. Michael Hoffmann
Organisation: KIT Department of Mechanical Engineering

Part of: Engineering Sciences (Specialisation Program Engineering Sciences)
Compulsory Elective Modules (Business Administration oder Engineering Sciences)
Compulsory Elective Modules (Engineering Sciences)

<table>
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<th>Credits</th>
<th>Grading scale</th>
<th>Recurrence</th>
<th>Duration</th>
<th>Language</th>
<th>Level</th>
<th>Version</th>
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<tbody>
<tr>
<td>9</td>
<td>Grade to a tenth</td>
<td>Each term</td>
<td>1 term</td>
<td>German</td>
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Specialization Materials Science (Election: at least 9 credits)

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
<th>Grading scale</th>
<th>Instructor</th>
</tr>
</thead>
<tbody>
<tr>
<td>T-MACH-102141</td>
<td>Constitution and Properties of Wearresistant Materials</td>
<td>4 CR</td>
<td>Ulrich</td>
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<tr>
<td>T-MACH-105179</td>
<td>Functional Ceramics</td>
<td>4 CR</td>
<td>Hinterstein, Rheinheimer</td>
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<tr>
<td>T-MACH-100287</td>
<td>Introduction to Ceramics</td>
<td>6 CR</td>
<td>Hoffmann</td>
<td></td>
</tr>
<tr>
<td>T-MACH-102102</td>
<td>Physical Basics of Laser Technology</td>
<td>5 CR</td>
<td>Schneider</td>
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<tr>
<td>T-MACH-102137</td>
<td>Polymer Engineering I</td>
<td>4 CR</td>
<td>Liebig</td>
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</tr>
<tr>
<td>T-MACH-102138</td>
<td>Polymer Engineering II</td>
<td>4 CR</td>
<td>Liebig</td>
<td></td>
</tr>
<tr>
<td>T-MACH-102157</td>
<td>High Performance Powder Metallurgy Materials</td>
<td>4 CR</td>
<td>Schell</td>
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</tr>
<tr>
<td>T-MACH-102179</td>
<td>Structural Ceramics</td>
<td>4 CR</td>
<td>Hoffmann</td>
<td></td>
</tr>
<tr>
<td>T-MACH-102170</td>
<td>Structural and Phase Analysis</td>
<td>4 CR</td>
<td>Hinterstein, Wagner</td>
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</tr>
<tr>
<td>T-MACH-100531</td>
<td>Systematic Materials Selection</td>
<td>4 CR</td>
<td>Dietrich, Schulze</td>
<td></td>
</tr>
<tr>
<td>T-MACH-102139</td>
<td>Failure of Structural Materials: Fatigue and Creep</td>
<td>4 CR</td>
<td>Gruber, Gumbsch</td>
<td></td>
</tr>
<tr>
<td>T-MACH-102140</td>
<td>Failure of Structural Materials: Deformation and Fracture</td>
<td>4 CR</td>
<td>Gumbsch, Weygand</td>
<td></td>
</tr>
<tr>
<td>T-MACH-102079</td>
<td>Material Science II for Business Engineers</td>
<td>5 CR</td>
<td>Hoffmann</td>
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</table>

Competence Certificate
The assessment is carried out as partial exams (according to Section 4(2), 1 or 2 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The examinations take place at the beginning of the recess period. Re-examinations are offered at every ordinary examination date. The assessment procedures are described for each course of the module separately.

Prerequisites
None

Competence Goal
Students acquire and deepen skills in fundamentals of materials science and engineering and can apply them to technical problems. Specific teaching objectives are agreed with the respective coordinator of the course.

Content
The module content depends on the elected courses.

Module grade calculation
The overall grade of the module is removed from the average of the partial examinations, with at least two partial exams need to be.

Workload
The module requires an average workload of 270 hours.

Learning type
Lecture, Tutorial.
Module: Energy Economics [M-WIWI-101464]

**Responsible:** Prof. Dr. Wolf Fichtner

**Organisation:** KIT Department of Economics and Management

**Part of:**
- Business Administration (Specialisation Program Business Administration)
- Compulsory Elective Modules (Business Administration oder Engineering Sciences)
- Compulsory Elective Modules (Business Administration)

<table>
<thead>
<tr>
<th>Credits</th>
<th>Grading scale</th>
<th>Recurrence</th>
<th>Duration</th>
<th>Language</th>
<th>Level</th>
<th>Version</th>
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<tr>
<td>9</td>
<td>Grade to a tenth</td>
<td>Each term</td>
<td>1 term</td>
<td>German/English</td>
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**Credits:** 9

**Grading scale:** Grade to a tenth

**Recurrence:** Each term

**Duration:** 1 term

**Language:** German/English

**Level:** 3

**Version:** 4

**Mandatory**

| T-WIWI-102746 | Introduction to Energy Economics | 5.5 CR | Fichtner |

**Supplementary Courses (Elect: 3.5 credits)**

| T-WIWI-102607 | Energy Policy | 3.5 CR | Wietschel |
| T-WIWI-100806 | Renewable Energy-Resources, Technologies and Economics | 3.5 CR | Jochem |

**Competence Certificate**

The assessment is carried out as partial written exams (according to Section 4(2), 1 of the examination regulation) about the lecture *Introduction into Energy Economics* [2581010] and one optional lecture of the module. The examinations are offered every semester. Re-examinations are offered at every ordinary examination date. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

**Prerequisites**

The lecture *Introduction into Energy Economics* [2581010] has to be examined.

**Competence Goal**

The student

- is able to understand interdependencies in energy economics and to evaluate ecological impacts in energy supply,
- is able to assess the different energy carriers and their characteristics,
- knows the energy political framework conditions,
- gains knowledge about new market-based conditions and the cost and potentials of renewable energies in particular.

**Content**

- Introduction to Energy Economics: Characterisation (reserves, suppliers, cost, technologies) of different energy carriers (coal, gas, oil, electricity, heat etc.)
- Renewable Energy - Resources, Technology and Economics: Characterisation of different renewable energy carriers (wind, solar, hydro, geothermal etc.)
- Energy Policy: Management of energy flows, energy-political targets and instruments (emission trading etc.)

**Annotation**

Additional study courses (E.g. from other universities) can be transferred to the grade of the module on special request at the institute.

**Workload**

The total workload for this module is approximately 270 hours. For further information see German version.

**Recommendation**

The courses are conceived in a way that they can be attended independently from each other. Therefore, it is possible to start the module in winter and summer term.
7.19 Module: Energy Generation and Network Components [M-ETIT-101165]

**Responsible:** Dr.-Ing. Bernd Hoferer  
Prof. Dr.-Ing. Thomas Leibfried

**Organisation:** KIT Department of Electrical Engineering and Information Technology

**Part of:** Compulsory Elective Modules (Business Administration oder Engineering Sciences)

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**Mandatory**

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**Competence Certificate**

The assessment is carried out as partial exams (according to Section 4(2), 1 or 2 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The examinations take place at the beginning of the recess period. Re-examinations are offered at every ordinary examination date. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the weighted average of the grades for each course and truncated after the first decimal.

**Prerequisites**

It is only possible to choose this module in combination with the module Power Networks [WW3INGETIT3]. The module is passed only after the final partial exam of Power Networks is additionally passed.

**Competence Goal**

The student

- has basic and advanced knowledge of electrical power engineering,
- is capable to analyse, calculate and develop electrical power engineering systems.

**Content**

The module deals with basic knowledge about the structure and operation of electrical power networks and their needed facilities. Further lectures give an insight into specific topics, such as the procedures for generating electrical energy or the Photovoltaic System Design.

**Workload**

The total workload for this module is approximately 270 hours. For further information see German version.

**Responsible:** Prof. Dr.-Ing. Alexander Fidlin  
**Organisation:** KIT Department of Mechanical Engineering  
**Part of:** Engineering Sciences (mandatory)

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**Mandatory**

| T-MACH-102208 | Introduction to Engineering Mechanics I: Statics and Strength of Materials | 3 CR | Fidlin |

**Competence Certificate**  
The assessment consists of a written examination taking place in the recess period (according to Section 4(2), 1 of the examination regulation). The examination takes place in every semester. Re-examinations are offered at every ordinary examination date.

Permitted utilities: non-programmable calculator, literature

**Prerequisites**  
None

**Competence Goal**  
**Professional competences:**
Students will
- know and understand the basic elements of statics;
- be able to carry out simple static calculations on their own;
- know the basic concepts of strength theory: stress, strain and their relationship within the framework of elementary elasticity theory;
- know the most common strength hypotheses;
- be able to calculate independently rods, shafts and beams;
- know the classical cases of stability loss in compressed beams.

**Interdisciplinary competences:**
Students are familiar with analytical procedures and problem-oriented thinking. They are aware of the complexity of engineering problems and are able to identify and focus on the key issues within them. Students are able to use their acquired knowledge theoretical analysis of practically relevant engineering problems and to develop approaches to their solution.

**Content**  
Statics: force • moment • general equilibrium conditions • center of gravity • inner forces in structure • plane frameworks • adhesion

**Annotation**
Starting summer 2016 the course "Introduction to Engineering Mechanics I: Statics and Strength of Materials" [2162238] will be held in summer term.

**Workload**  
The total workload for this module is approximately 90 hours

**Learning type**  
Lecture and exercises
Module: Essentials of Finance [M-WIWI-101435]

**Responsible:** Prof. Dr. Martin Ruckes  
Prof. Dr. Marliese Uhrig-Homburg

**Organisation:** KIT Department of Economics and Management

**Part of:**  
Business Administration (Specialisation Program Business Administration)  
Compulsory Elective Modules (Business Administration oder Engineering Sciences)  
Compulsory Elective Modules (Business Administration)

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**Compentence Certificate**

The assessment is carried out as partial written exams (according to Section 4(2), 1 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The examinations are offered every semester. Re-examinations are offered at every ordinary examination date. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

**Prerequisites**

None

**Competence Goal**

The student

- has fundamental skills in modern finance
- has fundamental skills to support investment decisions on stock, bond and derivative markets
- applies concrete models to assess investment decisions on financial markets as well as corporate investment and financing decisions.

**Content**

The module *Essentials of Finance* deals with fundamental issues in modern finance. The courses discuss fundamentals of the valuation of stocks. A further focus of this module is on modern portfolio theory and analytical methods of capital budgeting and corporate finance.

**Workload**

The total workload of the module is about 240 hours. The workload is proportional to the credit points of the individual courses.
7.22 Module: Extracurricular Module in Engineering [M-WIWI-101404]

**Responsible:** Prüfungsausschuss der KIT-Fakultät für Wirtschaftswissenschaften

**Organisation:** KIT Department of Economics and Management

**Part of:**
- Engineering Sciences (Specialisation Program Engineering Sciences)
- Compulsory Elective Modules (Business Administration oder Engineering Sciences)
- Compulsory Elective Modules (Engineering Sciences)

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**Compulsory Elective Courses (Election: between 9 and 12 credits)**

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**Competence Certificate**

The assessment of the module is determined by the respective module coordinator. It can either be in the form of a general exam or partial exams, and must contain at least 9 credit points (max. 12 credits) and at least 6 hours per week (max. 8 hours per week). The examination may contain presentations, experiments, laboratories, term papers, etc. At least 50 percent of the module examination has to be in the form of a written or an oral examination (according to Section 4 (2), 1 or 2 of the examination regulation).

The formation of the overall grade of the module will be determined by the respective module coordinator.

**Prerequisites**

The current regulations and guidance on the procedure for applying for an extracurricular module in engineering are explained in detail at [https://www.wiwi.kit.edu/APIng-Modul.php](https://www.wiwi.kit.edu/APIng-Modul.php).

**Competence Goal**

Through the extracurricular engineering module, the student is able to deal with technical topics and issues in depth.

The concrete learning objectives are coordinated with the respective module supervisor of the module.

**Workload**

The total workload for this module is about 270 hours (9 credits). The distribution is based on the credit points of the courses completed as part of the module.
7.23 Module: Financial Data Science [M-WIWI-105610]

**Responsible:** Prof. Dr. Maxim Ulrich

**Organisation:** KIT Department of Economics and Management

**Part of:**
- Business Administration (Specialisation Program Business Administration)
- Compulsory Elective Modules (Business Administration oder Engineering Sciences)
- Compulsory Elective Modules (Business Administration)

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**Mandatory**

| T-WIWI-111238 | Financial Data Science | 9 CR | Ulrich |

**Competence Certificate**

Due to the professor’s research sabbatical, the BSc module “Financial Data Science” and MSc module “Foundations for Advanced Financial -Quant and -Machine Learning Research” and the MSc module “Advanced Machine Learning and Data Science” along with the respective examinations will not be offered in SS2023. Bachelor and Master thesis projects are not affected and will be supervised.

The module examination is an alternative exam assessment and consists of two parts in which a maximum of 100 points can be achieved:

In the first part of the examination, a maximum of 30 points can be achieved, which are distributed equally weighted over eight worksheets to be submitted during the semester. The worksheets of the first three weeks are representative for all following worksheets in terms of scope and degree of difficulty. With the beginning of the 4th week of the course, the handing in of the worksheets is considered to be part of the alternative exam assessment.

A maximum of 70 points can be achieved in the second part of the examination. For this part of the examination, the student write a "Final Exam" in the last week of the lecture period, which takes 2 hours.

Detailed information about the course schedule and the module exam will be announced at the first course date.

A retake opportunity for those who do not pass the module exam will take place at the end of the fourth September calendar week of the same year. The registration for the examination must be made at least 1 day before the beginning of the examination. The following applies to deregistration for the examination: Deregistration can be made online in the student portal up to 1 day before the start of the examination.

**Competence Goal**

The objective of the module is to provide fundamental financial knowledge for advanced applications in Financial Data Science and Financial Machine Learning. The course teaches concepts and provides weekly Python assignments to scientifically address the following topics: Robo Advisory, Linear Factor Models, Statistical Arbitrage, Monte Carlo Simulation, and Financial Machine Learning. The course is for the students, who are interested in financial markets, as well as for the students, who are interested in Data Science. Scientific financial market knowledge helps in creating financial innovations, such as a Robo Advisor. Practical knowledge in using Python helps in coding machines, which are essential for offering automated financial market solutions.

**Content**

The module covers the following topics:

- Robo Advisory: Investor preferences, Expected utility theory, Mean-variance optimal investing
- Linear Factor Models: prediction of returns, decomposition of risks, Capital Asset Pricing Model, Arbitrage Pricing Theory
- Statistical Arbitrage: ARMA-GARCH Modeling of Return Time Series
- Monte Carlo Simulation: Simulation of ARMA-GARCH processes
- Machine Learning: Least Squares Methods, Maximum Likelihood, Prediction of Returns, Prediction of Risks
- New developments in asset management: factor investing, smart beta, I-CAPM, Fama-MacBeth estimation of risk premia, factor anomalies

**Annotation**

Please note that the module is only offered every second summer semester (SS2021, SS2023).

**Workload**

The total workload for this module is approx. 270 hours (9 credit points). The total number of hours results from the effort for studying online videos, working on quiz questions, studying Ipython-Notebooks, participating in interactive "Python Sessions" and reading the recommended literature.
7.24 Module: Financing and Accounting [M-WIWI-105769]

**Responsible:**  
Prof. Dr. Martin Ruckes  
Dr. Jan-Oliver Strych  
Prof. Dr. Marcus Wouters

**Organisation:**  
KIT Department of Economics and Management

**Part of:**  
Business Administration (mandatory)

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**Mandatory**

| T-WIWI-112820 | Introduction to Finance and Accounting | 5 CR | Ludecke, Ruckes, Strych, Uhrig-Homburg, Wouters |

**Competence Certificate**

The module examination is in written form. The examination is offered at the beginning of each lecture-free period. Repeat examinations are possible at any regular examination date.

**Competence Goal**

The student

- has basic knowledge in financial assessment of important business decisions and the functioning of financial markets,
- has an understanding of problems, interrelationships and solutions of internal accounting of companies,
- knows the structures and functions of external accounting,
- has an overview of important components of the annual financial statements of companies and is able to assess them economically.

With the knowledge acquired in the three basic business administration modules, the prerequisites are created in the area of business administration to expand this knowledge in the specialization program.

**Content**

The fundamentals for the financial analysis of important business decisions are taught. In addition, the fundamentals of internal and external accounting are laid and an introduction is given to accounting and the annual financial statements.

**Workload**

Total workload required for 5 credit points: approx. 150 hours
7.25 Module: Foundations of Informatics [M-WIWI-101417]

**Responsible:** Dr.-Ing. Michael Färber  
**Prof. Dr. Sanja Lazarova-Molnar**

**Organisation:** KIT Department of Economics and Management

**Part of:** Informatics (mandatory)

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**Competence Certificate**

The assessment is carried out as partial exams (according to Section 4(2), 1 and 3 of the examination regulation) of the individual courses of this module.

The examinations are offered every semester. Re-examinations are offered at every ordinary examination date. For a successful module assessment both partial exams have to be passed.

- Foundations of Informatics I: Written exam in the first week of the recess period (60 min)
- Foundations of Informatics II: Written exam in the first week of the recess period (90 min). It is possible to gain 0.3-0.4 additional grading points for a passed exam by successful completion of a bonus exam.

When both partial exams are passed, the overall grade of the module is the average of the grades for each course weighted by the credit points and truncated after the first decimal.

**Prerequisites**

None

**Competence Goal**

The student

- knows the main principles, methods and systems of computer science,
- can use this knowledge for applications in advanced computer science courses and other areas for situation-adequate problem solving,
- is capable of finding strategic and creative responses in the search for solutions to well defined, concrete, and abstract problems.

The student can deepen the learned concepts, methods, and systems of computer science in advanced computer science lectures.

**Content**

This module conveys knowledge about modeling, logic, algorithms, sorting and searching algorithms, complexity theory, problem specifications, and data structures. From the field of theoretical computer science, formal models of automata, languages and algorithms are presented and applied to the architecture of computer systems.

**Workload**

The total workload for this module is approximately 300 hours.

**Recommendation**

It is strongly recommended to attend the courses of the core program in the following sequence: Introduction to Programming with Java, Foundations of Informatics I, Foundations of Informatics II
Module: Foundations of Marketing [M-WIWI-101424]

**Responsible:** Prof. Dr. Martin Klarmann

**Organisation:** KIT Department of Economics and Management

**Part of:**
- Business Administration (Specialisation Program Business Administration)
- Compulsory Elective Modules (Business Administration oder Engineering Sciences)
- Compulsory Elective Modules (Business Administration)

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**Supplementary Courses (Election: at least 4,5 credits)**

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**Competence Certificate**

The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the core course and further single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

**Prerequisites**

The course Marketing Mix is compulsory and must be examined.

**Competence Goal**

The aim of this module is to prepare students for a job in marketing or sales. Especially in technically oriented companies, employees who have a certain technical background as industrial engineers or business informatics specialists are often fit for this purpose.

Students

- are familiar with the most important concepts, procedures and theories of the four instruments of the marketing mix (product management, price management, communication management and sales management)
- have the knowledge to make decisions regarding current and future products (product innovations, e.g. by using conjoint analysis)
- know how customers perceive brands and how this perception can be influenced by the company
- understand how customers react to prices (e.g. using price-sales functions)
- can determine prices on the basis of conceptual and quantitative considerations
- know the basics of price differentiation
- are familiar with various communication instruments (e.g. TV advertising) and can design them accurately
- make communication decisions systematically (e.g. by means of media planning)
- can segment the market and position the product
- know how to assess the importance and satisfaction of customers.

Additionally when taking the course “B2B Sales Management”:

- can shape the relationship with customers and sales partners and know the basics of sales organization as well as essential sales channel decisions
- know about specifics of marketing in B2B
- are able to identify different B2B business types and their peculiarities in marketing and sales
- are able to prioritize customers and calculate B2B customer lifetime value
- are able to determine value-based prices and prepare and conduct B2B sales presentations.

Additionally when taking the course “Consumer Behavior”:

- know about the influences of social factors, neuronal processes and cognitive resources on consumer behavior
- know about the influences of evolutionary factors, emotions, individual differences and motivation on consumer behavior.
Content
The core course of the module is "Marketing Mix". This course is compulsory and must be examined. "Marketing Mix" contains instruments and methods that enable you to goal-oriented decisions in the operative marketing management (product management, pricing, promotion and sales management). In the "B2B Sales Management" course, we impart knowledge about marketing and sales in environments in which companies themselves distribute and market (often technically highly complex) products to other companies ("business-to-business"). In the "Consumer Behavior" course, we provide an understanding of situational, biological, cognitive, and evolutionary factors that influence consumer behavior. This understanding is provided from an interdisciplinary perspective, incorporating relevant theories and empirical research findings from psychology, cognitive science, biology, and economics.

Annotation
The courses "Services Marketing and B2B Marketing" and "International Marketing" were offered for the last time in the winter semester 2020/21 and will be replaced by the course "B2B Sales Management" from the winter semester 2021/22 on. The course "Marketing Mix" will continue to be offered as normal in the summer semester 2021 and will also be retained in the long term. For further information please contact the Marketing & Sales Research Group (marketing.iism.kit.edu).

Workload
Total effort for 9 credit points: approx. 270 hours.
The exact distribution is done according to the credit points of the courses of the module.
Module: Fundamentals of Construction [M-BGU-101004]

Responsible: Prof. Dr.-Ing. Shervin Haghsheno
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: Engineering Sciences (Specialisation Program Engineering Sciences)
Compulsory Elective Modules (Business Administration oder Engineering Sciences)
Compulsory Elective Modules (Engineering Sciences)

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Prerequisites
none

Competence Goal
The student
• is familiar with all substantial domains of construction
• knows and understands substantial construction methods and construction machines
• masters basic construction calculations
• knows and understands the fundamentals of project management in civil engineering
• can apply his / her knowledge in a goal-oriented manner to accomplish a construction project efficiently

Annotation
We encourage students to deepen their knowledge in construction by building additional customized modules from the courses offered by TMB. Please consult with the tutors of this module. Further information is available at www.tmb.kit.edu.

Recommendation
None

**Responsible:** Prof. Dr. Gerhard Satzger  
Prof. Dr. Christof Weinhardt

**Organisation:** KIT Department of Economics and Management

**Part of:**  
- Business Administration (Specialisation Program Business Administration)  
- Compulsory Elective Modules (Business Administration oder Engineering Sciences)  
- Compulsory Elective Modules (Business Administration)

| Compulsory Elective Courses ( Election: 9 credits) |  
|---------------------------------------------------|---  
| T-WIWI-111307 Digital Services: Foundations | 4.5 CR Satzger, Vössing  
| T-WIWI-109816 Foundations of Interactive Systems | 4.5 CR Mädche  
| T-WIWI-110888 Practical Seminar: Digital Services | 4.5 CR Satzger, Weinhardt

**Compentence Certificate**  
The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO), whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

**Prerequisites**  
None

**Compentence Goal**  
Students

- understand services from different perspectives and the concept of value creation in service networks  
- know about the concepts, methods and tools for the design, modelling, development and management of digital services and are able to use them  
- understand the basic characteristics and effects of integrated information system as a an integral element of digital services  
- gain experience in group work as well as in the analysis of case studies and the professional presentation of research results  
- practice skills in the English language in preparation of jobs in an international environment

**Content**  
Global economy is increasingly determined by services: in industrialized countries nearly 70% of gross value added is achieved in the tertiary sector. Unfortunately, for the design, development and the management of services traditional concepts focused on goods are often insufficient or inappropriate. Besides, the rapid technical advance in the information and communication technology sector pushes the economic importance of digital services even further thus changing the competition environment. ICT-based interaction and individualization open up completely new dimensions of shared value between clients and providers, dynamic and scalable “service value networks” replace established value chains, digital services are provided globally crossing geographical boundaries. This module establishes a basis for further specialization in service innovation, service economics, service design, service modelling, service analytics as well as the transformation and coordination of service networks.

**Annotation**  
This module is part of the KSRI teaching profile “Digital Service Systems”. Further information on a service-specific profiling is available under www.ksri.kit.edu/teaching.

**Workload**  
The total workload for this module is approximately 270 hours. For further information see German version.

**Recommendation**  
None
7.29 Module: Handling Characteristics of Motor Vehicles [M-MACH-101264]

**Responsible:** Prof. Dr. Frank Gauterin

**Organisation:** KIT Department of Mechanical Engineering

**Part of:**
- Engineering Sciences (Specialisation Program Engineering Sciences)
- Compulsory Elective Modules (Business Administration oder Engineering Sciences)
- Compulsory Elective Modules (Engineering Sciences)

<table>
<thead>
<tr>
<th>Credits</th>
<th>Grade scale</th>
<th>Recurrence</th>
<th>Duration</th>
<th>Language</th>
<th>Level</th>
<th>Version</th>
</tr>
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<tr>
<td>9</td>
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<td>Each term</td>
<td>1 term</td>
<td>German/English</td>
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**Vehicle Properties (Election: at least 9 credits)**

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<tr>
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<th>Course Description</th>
<th>Credits</th>
<th>Grading</th>
<th>Recurrence</th>
<th>Duration</th>
<th>Language</th>
<th>Level</th>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>MACH-105152</td>
<td>Handling Characteristics of Motor Vehicles I</td>
<td>3 CR</td>
<td>Unrau</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>MACH-105153</td>
<td>Handling Characteristics of Motor Vehicles II</td>
<td>3 CR</td>
<td>Unrau</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>MACH-105154</td>
<td>Vehicle Comfort and Acoustics I</td>
<td>3 CR</td>
<td>Gauterin</td>
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<tr>
<td>MACH-105155</td>
<td>Vehicle Comfort and Acoustics II</td>
<td>3 CR</td>
<td>Gauterin</td>
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<tr>
<td>MACH-102156</td>
<td>Project Workshop: Automotive Engineering</td>
<td>4,5 CR</td>
<td>Frey, Gauterin, Gießler</td>
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**Competence Certificate**
The assessment is carried out as partial exams (according to Section 4(2) of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

**Prerequisites**
None

**Competence Goal**
The student
- knows and understands the characteristics of vehicles, owing to the construction and design tokens,
- knows and understands especially the factors being relevant for comfort and acoustics
- is capable of fundamentally evaluating and rating handling characteristics.

**Content**
See courses.

**Workload**
The total work load for this module is about 270 Hours (9 Credits). The partition of the work load is carried out according to the credit points of the courses of the module. The work load for courses with 4.5 credit points is about 135 hours, and for courses with 3 credit points about 90 hours. The total number of hours per course results from the time of visiting the lectures and exercises, as well as from the exam duration and the time that is required to achieve the objectives of the module as an average student with an average performance.

**Recommendation**
7.30 Module: HR Management & Digital Workplace [M-WIWI-105928]

Responsibility: Prof. Dr. Alexander Mädche
Prof. Dr. Petra Nieken

Organisation: KIT Department of Economics and Management

Part of: Business Administration (Specialisation Program Business Administration)
Compulsory Elective Modules (Business Administration oder Engineering Sciences)
Compulsory Elective Modules (Business Administration)

Elective Offer (Election:)

<table>
<thead>
<tr>
<th>Credits</th>
<th>Grading scale</th>
<th>Recurrence</th>
<th>Duration</th>
<th>Language</th>
<th>Level</th>
<th>Version</th>
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<tbody>
<tr>
<td>9</td>
<td>Grade to a tenth</td>
<td>Each term</td>
<td>2 terms</td>
<td>German/English</td>
<td>3</td>
<td>1</td>
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Elective Offer (Election:)

<table>
<thead>
<tr>
<th>CR</th>
<th>Course Description</th>
<th>Credits</th>
<th>Instructor</th>
</tr>
</thead>
<tbody>
<tr>
<td>T-WIWI-102909</td>
<td>Human Resource Management</td>
<td>4.5 CR</td>
<td>Nieken</td>
</tr>
<tr>
<td>T-WIWI-111858</td>
<td>Topics in Human Resource Management</td>
<td>3 CR</td>
<td>Nieken</td>
</tr>
<tr>
<td>T-WIWI-109816</td>
<td>Foundations of Interactive Systems</td>
<td>4.5 CR</td>
<td>Mädche</td>
</tr>
<tr>
<td>T-WIWI-111914</td>
<td>Practical Seminar: Interactive Systems</td>
<td>4.5 CR</td>
<td>Mädche</td>
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</table>

Competence Certificate
The assessment is carried out as partial exams of the courses in this module. The assessment procedures are described for each course in the module separately.

The overall grade of the module is the average of grades for each course weighted by the credits and truncated after the first decimal.

Prerequisites
Please refer to the course descriptions for potential restrictions regarding an individual course.

Competence Goal
The student

- understands and analyses challenges and objectives within organizations
- applies economic models and empirical methods to analyze and solve challenges with a focus on the future of work
- understands the impact of digitalization and new information and communication technology on the work life and HR decisions
- knows how to apply scientific research methods and understands the underlying problems

Content
The module „HR Management & Digital Workplace“ offers an interdisciplinary approach and brings together knowledge about Human Resource Management, Leadership and Digitalization. The module specifically focuses on topics related to the future of work in organizations. The topics range from interactive systems at the digital workplace and human-centered design, to recruiting, training and development, as well as (digital) leadership. All courses in the module foster active participation and allow students to learn state-of-the-art concepts and methods and apply them to real-world challenges.

Annotation
Please refer to the course descriptions for potential restrictions regarding an individual course.

Workload
Total workload for 9 credits: approx. 270 hours.
7.31 Module: Human Resources and Organizations [M-WIWI-101513]

**Responsible:** Prof. Dr. Petra Nieken

**Organisation:** KIT Department of Economics and Management

**Part of:**
- Business Administration (Specialisation Program Business Administration)
- Compulsory Elective Modules (Business Administration oder Engineering Sciences)
- Compulsory Elective Modules (Business Administration)

**Credits:** 9

**Grading scale:** Grade to a tenth

**Recurrence:** Each term

**Duration:** 2 terms

**Language:** German

**Level:** 3

**Version:** 5

**Competence Certificate**
The assessment is carried out as partial written exams or alternative exam assessment of the single courses of this module. The examinations are offered every semester. Re-examinations are offered at every ordinary examination date. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

**Prerequisites**
The course T-WIWI-111858 Topics in Human Resource Management may not be taken together with the course T-WIWI-102871 Problem Solving, Communication, and Leadership.

**Competence Goal**
The student
- knows and analyzes basic concepts, instruments, and challenges of present human resource and organizational management.
- uses the techniques he / she has learned to evaluate strategic situations which occur in human resource and organizational management.
- evaluates the strengths and weaknesses of existing structures and rules based on systematic criterions.
- Discusses and evaluates the practical use of models and methods by using case studies.
- has basic knowledge of fit and challenges of different scientific methods in the context of personnel and organizational economics.

**Content**
Students acquire basic knowledge in the field of human resources, personnel economics and organization economics. Strategic as well as operative aspects of human resource management practices are analyzed and current research results discussed. Students gain knowledge about methods and instruments from the field of human resources and are able to apply those. The module addresses the opportunities and threats of digitalization in the workplace as well as the use of AI in HRM. In addition, questions of optimal organizational design or personnel politics are considered. The focus lies on the strategic analysis of decisions and the use of microeconomic or behavioral approaches. Empirical results of field or lab studies are discussed critically.

**Workload**
Total workload for 9 credits: approx. 270 hours.

**Recommendation**
Completion of module Business Administration is recommended.
Basic knowledge of microeconomics, game theory and statistics is recommended.
Module: Industrial Production I [M-WIWI-101437]

M Mandatory

<table>
<thead>
<tr>
<th>Credits</th>
<th>Grading scale</th>
<th>Recurrence</th>
<th>Duration</th>
<th>Language</th>
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<tr>
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<td>Each term</td>
<td>2 terms</td>
<td>German/English</td>
<td>3</td>
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</table>

T-WIWI-102606  Fundamentals of Production Management  5.5 CR  Schultmann

T-WIWI-102870  Logistics and Supply Chain Management  3.5 CR  Schultmann

T-WIWI-102820  Production Economics and Sustainability  3.5 CR  Schultmann, Volk

Supplementary Courses (Election: 3.5 credits)

Competence Certificate

The assessment is carried out as partial exams (according to section 4 (2), 1 SPO) of the core course “Fundamentals of Production Management” [2581950] and one further single course of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Prerequisites

The course “Fundamentals of Production Management” [2581950] and one additional activity have to be chosen.

Competence Goal

- Students shall be aware of the important role of industrial production and logistics for production management.
- Students shall use relevant concepts of production management and logistics in an adequate manner.
- Students shall be able to reflect on decision principles in firms and their circumstances in the light of the production management aspects studied.
- Students shall be proficient in describing essential tasks, difficulties and solutions to problems in production management and logistics.
- Students shall be able to describe relevant approaches of modeling production and logistic systems.
- Students shall be aware of the important role of material and energy-flows in production systems.
- Students shall be proficient in using exemplary methods for solving selected problems.

Content

This module is designed to introduce students into the wide area of industrial production and logistics management. It focuses on strategic production management under the aspect of sustainability. The courses use interdisciplinary approaches of systems, also theory to describe the central tasks of industrial production management and logistics. Herein, attention is drawn upon strategic corporate planning, research and development as well as site selection. Students will obtain knowledge in solving internal and external transport and storage problems with respect to supply chain management and disposal logistics.

Workload

Total effort will account to 270 hours (9 credit points) and can be allocated according to the credit point rating. Therefore, a course with 3.5 credits requires an effort of approximately 105h and a course with 5.5 credits 165h.

The total effort for each course consists of attending lectures and tutorials, examination times and the time an average student needs to prepare himself in order to pass the exam with an average grade.

**Responsible:**
Prof. Dr. Alexander Mädche
Prof. Dr. Gerhard Satzger
Prof. Dr. Christof Weinhardt

**Organisation:**
KIT Department of Economics and Management

**Part of:**
- Business Administration (Specialisation Program Business Administration)
- Compulsory Elective Modules (Business Administration or Engineering Sciences)
- Compulsory Elective Modules (Business Administration)

<table>
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<th>Credits</th>
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<th>Recurrence</th>
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<th>Language</th>
<th>Level</th>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>Grade to a tenth</td>
<td>Each term</td>
<td>2 terms</td>
<td>German/English</td>
<td>3</td>
<td>2</td>
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**Compulsory Elective Courses (Election: at least 1 item)**

<table>
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<tr>
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<th>Course Title</th>
<th>Credits</th>
<th>Grading</th>
<th>Responsible</th>
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<tr>
<td>T-WIWI-106569</td>
<td>Consumer Behavior</td>
<td>4.5 CR</td>
<td>Scheibehenne</td>
<td></td>
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<tr>
<td>T-WIWI-111307</td>
<td>Digital Services: Foundations</td>
<td>4.5 CR</td>
<td>Satzger, Vössing</td>
<td></td>
</tr>
<tr>
<td>T-WIWI-110797</td>
<td>eFinance: Information Systems for Securities Trading</td>
<td>4.5 CR</td>
<td>Weinhardt</td>
<td></td>
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<tr>
<td>T-WIWI-109816</td>
<td>Foundations of Interactive Systems</td>
<td>4.5 CR</td>
<td>Mädche</td>
<td></td>
</tr>
<tr>
<td>T-WIWI-107506</td>
<td>Platform Economy</td>
<td>4.5 CR</td>
<td>Weinhardt</td>
<td></td>
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**Complementary Offer (Election: at most 1 item)**

<table>
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<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Grading</th>
<th>Responsible</th>
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</thead>
<tbody>
<tr>
<td>T-WIWI-110888</td>
<td>Practical Seminar: Digital Services</td>
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<tr>
<td>T-WIWI-112154</td>
<td>Practical Seminar: Platform Economy</td>
<td>4.5 CR</td>
<td>Satzger, Weinhardt</td>
<td></td>
</tr>
</tbody>
</table>

**Competence Certificate**
The module examination takes place in the form of partial examinations via courses of the module amounting to a total of at least 9 LP.
The overall score of the module is formed from the credit-weighted scores of the partial examinations and truncated after the first decimal place.

**Competence Goal**
Students
- understand the basic concepts of interactive systems as well as the economic foundations and key components of platforms
- explore the theoretical grounding of interactive systems leveraging theories from reference disciplines such as psychology
- understand business models, network effects of digital platforms and get to know different market forms and market mechanisms
- gain experience in group work as well as in the analysis of case studies and the professional presentation of research results
Content
The “Information Systems & Digital Business” modules of the research groups of Prof. Dr. Alexander Mädche (Information Systems & Service Design), Prof. Dr. Gerhard Satzger (Digital Service Innovation) and Prof. Dr. Christof Weinhardt (Information & Market Engineering), offer a comprehensive overview on important topics of digitalization – blending aspects of digital interaction, digital services and the platform economy. Courses in this module cover the aspects of interaction between humans and information systems as well as the economic foundations of platform businesses:

Foundations of Interactive Systems:
Advanced information and communication technologies (ICT) make interactive systems ever-present in the users’ private and business life. They are an integral part of E-Commerce portals or social networking sites as well as at the workplace, e.g. in the form of collaboration portals or analytical dashboards. Furthermore, with the ever-increasing capabilities of ICT, the design of human-computer interaction is becoming increasingly important. The aim of this module is to introduce the foundations, related theories, key concepts, and design principles as well as current practice of contemporary interactive systems. The students get the necessary knowledge to guide the successful implementation of interactive systems in business and private life.

Platform Economy:
Apple, Alphabet, Amazon, Microsoft, and Facebook; five of the most valuable companies worldwide create large portions of their profits by employing a digital platform model. This module teaches the key design considerations of digital platforms: their foundations in economic theory, their core components and design aspects, the adequate selection of market mechanisms for achieving certain goals, and the role of user behavior in the context of digital platforms. The theoretic foundations are enriched by discussions of several real-world examples, e.g. from the finance sector. Thus, the students are enabled to a) analyze given platforms and make recommendations for improvements and b) independently design new platforms for given use cases.

Consumer Behavior:
Consumer decisions are ubiquitous in daily life and they can have long-ranging and important consequences for individual (financial) well-being and health but also for societies and the planet as a whole. To help people to make better choices it is important to understand the factors that influence their behavior. Towards this goal, we will explore how consumer behavior is shaped by social influences, situational and cognitive constraints, as well as by emotions, motivations, evolutionary forces, neuronal processes, and individual differences. Across all topics covered in class, we will engage with basic theoretical work as well as with groundbreaking empirical research and current scientific debates. The lecture will be held in English.

Annotation
The module can no longer be taken as of winter semester 2022/2023.

Workload
Total effort for 9 credit points: approx. 270 hours. The distribution is based on the credit points of the courses of the module (120-135h for courses with 4.5 credit points). The total number of hours per course results from the effort required to attend lectures and exercises, as well as the examination times and the time required to achieve the learning objectives of the module for an average student for an average performance.
7.34 Module: Integrated Production Planning [M-MACH-101272]

**Responsible:** Prof. Dr.-Ing. Gisela Lanza

**Organisation:** KIT Department of Mechanical Engineering

**Part of:**
- Engineering Sciences (Specialisation Program Engineering Sciences)
- Compulsory Elective Modules (Business Administration oder Engineering Sciences)
- Compulsory Elective Modules (Engineering Sciences)

**Credits:** 9

**Grading scale:** Grade to a tenth

**Recurrence:** Each summer term

**Duration:** 1 term

**Language:** German

**Level:** 3

**Version:** 3

<table>
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<th>Mandatory</th>
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<tbody>
<tr>
<td>T-MACH-109054</td>
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</tbody>
</table>

**Competence Certificate**

Written Exam (120 min)

**Prerequisites**

none

**Competence Goal**

The students

- can discuss basic questions of production technology.
- are able to apply the methods of integrated production planning they have learned about to new problems.
- are able to analyze and evaluate the suitability of the methods, procedures and techniques they have learned about for a specific problem.
- can apply the learned methods of integrated production planning to new problems.
- can use their knowledge targeted for efficient production technology.

**Content**

Within this engineering sciences-oriented module the students will get to learn principle aspects of organization and planning of production systems.

**Workload**

regular attendance: 63 hours
self-study: 207 hours

**Learning type**

Lecture, exercise, excursion
### 7.35 Module: Internship [M-WIWI-101419]

**Responsible:** Studiendekan des KIT-Studienganges  
**Organisation:** KIT Department of Economics and Management  
**Part of:** Internship

<table>
<thead>
<tr>
<th>Credits</th>
<th>Grading scale</th>
<th>Recurrence</th>
<th>Duration</th>
<th>Level</th>
<th>Version</th>
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<td>1 term</td>
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</table>

#### Competence Certificate

The assessment is carried out by the evidence of completed full-time internships of at least 12 weeks with at least 20 working hours per week and a presentation of the internship in the form of a written report on the activities. The internship is not graded.

1. **Information on evidence of completed full-time internships:**

The internship is proofed by the certificate of the intern's office. The certificate has to be formally correct with official corporate letterhead and handwritten countersigned by a responsible employee of the company. The certificate must at least contain the following information:

- Company / Location
- Duration: from ... to ...
- Hours of work (weakly)
- Working interruption, indicating the vacation and sick days
- Department
- Headwords to the activities

2. **Information on the presentation:**

The internship report should be at least one page (typewritten, not handwritten) for each Location. It must be countersigned by a representative of the intern’s office.

**Prerequisites**

None

**Competence Goal**

- has general insight into the essential processes in a company,
- is in a position to identify operation correlations and has the knowledge and skills to facilitate a fast understanding of the processes in the company,
- in addition to practical professional experience and competences, also has key competences such as own initiative, ability to work in a team and communication skills as well as ability to integrate into corporate hierarchies and procedures,
- has the experience to accomplish complex IT and business tasks under realistic conditions within the framework of the relevant legal aspects and while applying the total acquired knowledge (interlaced thinking),
- has an idea of the professional development potential in the economy through pursuit of study-related activities,
- knows the technical and professional requirements in the individually targeted future occupation and can take this knowledge into account for the future planning of his/her studies and career,
- can assess and estimate own technical and professional strengths and weaknesses through his/her evaluation of the company.
Content
The internship may be done in economic, business and/or technical companies. At best, it is done on activities which are located at the intersection of the two fields - getting to know the specific requirements of Industrial Engineering and Management.
A commercial internship provides an insight into business or administrative processes of business transactions. Therefor departments such as controlling, organizing, marketing and planning appear particularly suitable.
Work experiences in the departments of engineering, work preparation and provision of material or IT cover more technical aspects of the internship. But work experiences in an engineering firm go with a technical internship.
It remains the companies and interns left, which stations and areas the intern will eventually go through. But the focus should always be in accordance with operational realities of the company.

Annotation
Internships, that were completed even before studying may be recognized, if the criteria for recognition are met. After recognition of the compulsory internship, there can be taken a semester off for a voluntary, student-related internship.
Regarding to the election of the company, in which the internship is completed, there are no specific rules. With a view to the future professional career, it is recommended to absolve the internship in a larger, possibly international company.
Vacation days are not figured into the internship.
Only three sick leave days may incurred at all. Any additional sick days are not figured into the internship.
A relevant vocational education of at least two years is accepted as a performance equivalent to the internship.

Workload
The total workload for this module is approximately 300 hours.
### 7.36 Module: Introduction to Economics [M-WIWI-101398]

**Responsible:** Prof. Dr. Clemens Puppe  
**Organisation:** KIT Department of Economics and Management  
**Part of:** Economics (mandatory)

<table>
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<th>Credits</th>
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<th>Recurrence</th>
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<th>Level</th>
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<tr>
<td>10</td>
<td>Grade to a tenth</td>
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**Mandatory**

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<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>T-WIWI-102708</td>
<td>Economics I: Microeconomics</td>
<td>5 CR</td>
<td>Puppe, Reiß</td>
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<tr>
<td>T-WIWI-102709</td>
<td>Economics II: Macroeconomics</td>
<td>5 CR</td>
<td>Wigger</td>
</tr>
</tbody>
</table>

**Competence Certificate**
The assessment is carried out as partial written exams (according to Section 4(2), 1 of the examination regulation) of the single courses of this module. The assessment procedures of each course of this module is defined for each course separately.

**Competence Goal**
The student

- knows and understands basic economic problems,
- understands economic policy in globalized markets,
- is able to develop elementary solution concepts.

The lectures of this module have different focuses: In Economics I, economic problems are seen as decision problems, Economics II treats the dynamics of economic processes.

**Content**
The basic concepts, methods and models of micro- and macroeconomics are treated. The course *Economics I: Microeconomics* [2600012] deals with micro-economic decision theory, questions of market theory and problems of imperfect competition and with basic principles of game theory and welfare economics. *Economics II: Macroeconomics* [2600014] discusses economic organization models and national accounts as well as the question of international trade and monetary policy. Furthermore, the complex growth, boom and economic speculations are dealt with.

**Module grade calculation**
The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

**Annotation**
*Notice:* The lecture *Economics I: Microeconomics* [2600012] is part of the preliminary examination concerning § 8(1) of the examination regulation in the study programs Industrial Engineering and Management B.Sc. and Economics Engineering B.Sc.. This examination must be passed until the end of the examination period of the second semester. Any Re-examinations has to be passed until the end of the examination period of the third semester. Otherwise the examination claim will be lost.

**Workload**
See German version.
Module: Introduction to Natural Hazards and Risk Analysis [M-WIWI-104838]

Responsible: apl. Prof. Dr. Michael Kunz
Organisation: KIT Department of Economics and Management
Part of: Engineering Sciences (Specialisation Program Engineering Sciences) Compulsory Elective Modules (Business Administration oder Engineering Sciences) Compulsory Elective Modules (Engineering Sciences)

<table>
<thead>
<tr>
<th>Credits</th>
<th>Grading scale</th>
<th>Recurrence</th>
<th>Duration</th>
<th>Language</th>
<th>Level</th>
<th>Version</th>
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<tbody>
<tr>
<td>9</td>
<td>Grade to a tenth</td>
<td>Each term</td>
<td>1 term</td>
<td>German</td>
<td>3</td>
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</table>

Compulsory Elective Courses (Electing: at least 9 credits)

- T-BGU-101500 Introduction to Engineering Geology 5 CR Blum
- T-BGU-103541 Introduction to GIS for Students of Natural, Engineering and Geo Sciences, Prerequisite 3 CR Wursthorn
- T-BGU-101681 Introduction to GIS for Students of Natural, Engineering and Geo Sciences 3 CR Wursthorn
- T-BGU-101637 Systems of Remote Sensing, Prerequisite 1 CR Cermak, Hinz, Weidner
- T-BGU-101638 Procedures of Remote Sensing, Prerequisite 1 CR Weidner
- T-BGU-101636 Remote Sensing, Exam 4 CR Hinz, Weidner
- T-BGU-103542 Procedures of Remote Sensing 3 CR Weidner
- T-PHYS-103525 Geological Hazards and Risk 8 CR Schäfer
- T-BGU-101693 Hydrology 4 CR Zehe
- T-PHYS-101092 Climatology 1 CR Ginete Werner Pinto
- T-PHYS-105594 Exam on Climatology 5 CR Ginete Werner Pinto
- T-BGU-101667 Hydraulic Engineering and Water Management 4 CR Rodrigues Pereira da Franca

Competence Certificate
The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the core course and further single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Prerequisites
There are no singular exams for Remote Sensing Systems [20241/42] and Remote Sensing Methods [20265/66]. Therefore it not possible to choose Remote Sensing [GEOD-BFB-1] and additionally the courses Remote Sensing Systems, Remote Sensing Methods or the project Angewandte Fernerkundung [20267] (because they are already included). See also "Recommendations".

Competence Goal
See German version

Content
See German version
Annotation
As a precaution, we would like to point out that the lecture belonging to the "Climatology" [T-PHYS-101092] has the number 4051111 and is read by Mr. Pinto. The lecture of the same name by Mr. Hogeward (6111031) does not belong to this course and is not creditable in this module.

Information on the course "Geological Hazards and Risk":

Language: English

Content:
- Earthquake Hazards
  - Short introduction to seismology and seismometry (occurrence of tectonic earthquakes, types of seismic waves, magnitude, intensity, source physics)
  - Induced seismicity
  - Engineering seismology, Recurrence intervals, Gutenberg-Richter, PGA, PGV, spectral acceleration, hazard maps
  - Earthquake statistics
  - Liquefaction
- Tsunami Hazards
- Landslide Hazards
- Hazards from Sinkholes
- Volcanic Hazards
  - Short introduction to physical volcanology
  - Types of volcanic hazards
- The Concept of Risk, Damage and Loss
- Data Analysis and the use of GIS in Risk analysis
- Risk Modelling - Scenario Analysis
- Risk Reduction and Risk Management
- Analysis Feedback and Prospects in the Risk Modelling Industry

Learning outcomes:
The students understand basic concepts of hazard and risk. They can explain in detail different aspects of earthquake hazard, volcanic hazard as well as other geological hazards, can compare and evaluate those hazards. They have fundamental knowledge of risk reduction and risk management. They know methods of risk modelling and are able to apply them.

Examination: Active and regular attendance of lecture and practicals. Project work (graded).

Workload:
60 h: active attendance during lectures and exercises
90 h: review, preparation and weekly assignments
90 h: project work

Workload
The total workload for this module is approximately 270 hours. For further information see German version.

Recommendation
The courses Remote Sensing Systems [20241/42] and Remote Sensing Methods [20265/66] may be chosen as a minimal combination for the exam. However, it is recommended to choose the comprehensive combination Remote Sensing [GEOD-BFB-1], which includes Remote Sensing Systems [20241/42], Remote Sensing Methods [20265/66] and the project Angewandte Fernerkundung [20267].
7.38 Module: Introduction to Operations Research [M-WIWI-101418]

<table>
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<tr>
<th>Credits</th>
<th>Grading scale</th>
<th>Recurrence</th>
<th>Duration</th>
<th>Language</th>
<th>Level</th>
<th>Version</th>
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<tr>
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<td>Grade to a tenth</td>
<td>Each summer term</td>
<td>2 terms</td>
<td>German</td>
<td>3</td>
<td>2</td>
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</tbody>
</table>

**Responsible:**
Prof. Dr. Stefan Nickel  
Prof. Dr. Steffen Rebennack  
Prof. Dr. Oliver Stein

**Organisation:**
KIT Department of Economics and Management

**Part of:**
Operations Research (mandatory)

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**Mandatory**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>T-WIWI-102758</td>
<td>Introduction to Operations Research I and II</td>
<td>9 CR</td>
</tr>
</tbody>
</table>

**Competence Certificate**
The assessment of the module is carried out by a written examination (120 minutes). In each term (usually in March and August), one examination is held for both courses.

**Prerequisites**
None

**Competence Goal**
The student

- names and describes basic notions of the essential topics in Operations Research (Linear programming, graphs and networks, integer and combinatorial optimization, nonlinear programming, dynamic programming and stochastic models),
- knows the indispensable methods and models for quantitative analysis,
- models and classifies optimization problems and chooses the appropriate solution methods to solve optimization problems independently,
- validates, illustrates and interprets the obtained solutions.

**Content**
This module treats the following topics: linear programming, network models, integer programming, nonlinear programming, dynamic programming, queueing theory, heuristic models.

This module forms the basis of a series of advanced lectures with a focus on both theoretical and practical aspects of Operations Research.

**Module grade calculation**
The overall grade of the module is the grade of the written examination.

**Workload**
The total workload for this module is approx. 270 hours (attendance time: 85 hours, other time for preparation and follow-up as well as exam preparation: 185 hours, 9 credit points). The total number of hours per course results from the time spent attending the lectures and exercises, as well as the examination times and the time required for an average student to achieve the learning objectives of the module.
7.39 Module: Introduction to Programming [M-WIWI-101581]

**Responsible:** Prof. Dr.-Ing. Johann Marius Zöllner  
**Organisation:** KIT Department of Economics and Management  
**Part of:** Informatics (mandatory)

<table>
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<th>Credits</th>
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<th>Duration</th>
<th>Language</th>
<th>Level</th>
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<td>Each winter term</td>
<td>1 term</td>
<td>German</td>
<td>3</td>
<td>1</td>
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</table>

**Mandatory**

| T-WIWI-102735 | Introduction to Programming with Java | 5 CR | Zöllner |

**Competence Certificate**
The assessment consists of a written resp. computer-based exam (60 min) according to Section 4 (2),1 of the examination regulation. The successful completion of the compulsory tests in the computer lab is prerequisite for admission to the written resp. computer-based exam. The examination takes place every semester. Re-examinations are offered at every ordinary examination date.

**Prerequisites**
None

**Competence Goal**
see german version

**Content**
see german version

**Workload**
The total workload for this course is approximately 150 hours. For further information see German version.
Module: Introduction to Statistics [M-WIWI-101432]

**Responsible:** Prof. Dr. Oliver Grothe  
Prof. Dr. Melanie Schienle

**Organisation:** KIT Department of Economics and Management

**Part of:** Statistics

<table>
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<th>Credits</th>
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<th>Duration</th>
<th>Language</th>
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<td>2 terms</td>
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</tr>
</tbody>
</table>

**Mandatory**

- T-WIWI-102737 Statistics I  
  5 CR Grothe, Schienle

- T-WIWI-102738 Statistics II  
  5 CR Grothe, Schienle

**Competence Certificate**
The assessment of this module consists of two written examinations according to Section 4(2), 1 of the examination regulation (one for each of the courses Statistics I and II).

The overall grade of the module is the average of the grades of these two written examinations.

**Prerequisites**

**Notice:** The lecture Statistics I [25008/25009] is part of the preliminary examination concerning Section 8(1) of the examination regulation. This examination must be passed until the end of the examination period of the second semester. Any Re-examinations has to be passed until the end of the examination period of the third semester. Otherwise the examination claim will be lost.

**Competence Goal**
See German version.

**Content**
The module contains the fundamental methods and scopes of Statistics.

A. Descriptive Statistics: univariate und bivariate analysis

B. Probability Theory: probability space, conditional and product probabilities, transformation of probabilities, parameters of location and dispersion, most important discrete and continuous distributions, covariance and correlation, limit distributions

C. Theory of estimation and testing: sufficiency of statistics, point estimation (optimality, ML-method), internal estimations, linear regression

**Module grade calculation**
The overall grade of the module is the average of the grades of these two written examinations.

**Workload**
The total workload for this module is approximately 300 hours. For further information see German version.
Module: Logistics and Supply Chain Management [M-MACH-105298]

Responsible: Prof. Dr.-Ing. Kai Furmans
Organisation: KIT Department of Mechanical Engineering

Part of:
- Engineering Sciences (Specialisation Program Engineering Sciences)
- Compulsory Elective Modules (Business Administration oder Engineering Sciences)
- Compulsory Elective Modules (Engineering Sciences)

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<th>Recurrence</th>
<th>Duration</th>
<th>Language</th>
<th>Level</th>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>Grade to a tenth</td>
<td>Each summer term</td>
<td>1 term</td>
<td>English</td>
<td>3</td>
<td>2</td>
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</table>

**Mandatory**

| T-MACH-110771 | Logistics and Supply Chain Management | 9 CR | Furmans |

**Competence Certificate**
The assessment consists of a 120 minutes written examination (according to §4(2), 1 of the examination regulation).

**Prerequisites**
None

**Competence Goal**
The student
- has comprehensive and well-founded knowledge of the central challenges in logistics and supply chain management, an overview of various practical issues and the decision-making requirements and models in supply chains,
- can model supply chains and logistics systems using simple models with sufficient accuracy,
- identifies cause-effect relationships in supply chains,
- is able to evaluate supply chains and logistics systems based on the methods they have mastered.

**Content**
Logistics and Supply Chain Management provides comprehensive and well-founded fundamentals for the crucial issues in logistics and supply chain management. Within the scope of the lectures, the interaction of different design elements of supply chains is emphasized. For this purpose, qualitative and quantitative description models are used. Methods for mapping and evaluating logistics systems and supply chains are also covered. The lecture contents are enriched by exercises and case studies and partially the comprehension of the contents is provided by case studies. The interacting of the elements will be shown, among other things, in the supply chain of the automotive industry.

**Module grade calculation**
grade of the module is grades of the exam

**Workload**
contact hours (1 HpW = 1 h x 15 weeks):
- lecture: 60 h

independent study:
- preparation and follow-up lectures: 90 h
- preparation of case studies: 60 h
- examination preparation: 60 h

total: 270 h

**Recommendation**
none

**Learning type**
Lectures, tutorials, case studies.
**Literature**


Dieter Arnold et. al.: Handbuch Logistik, 2008

Marc Goetschalkx: Supply Chain Engineering, 2011
Module: Machine Learning and Data Science [M-WIWI-105482]

Responsible: Prof. Dr. Andreas Geyer-Schulz
Organisation: KIT Department of Economics and Management
Part of: Business Administration (Specialisation Program Business Administration)
Compulsory Elective Modules (Business Administration oder Engineering Sciences)
Compulsory Elective Modules (Business Administration)

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<th>Credits</th>
<th>Grading scale</th>
<th>Recurrence</th>
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<th>Language</th>
<th>Level</th>
<th>Version</th>
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<tbody>
<tr>
<td>9</td>
<td>Grade to a tenth</td>
<td>Each term</td>
<td>2 terms</td>
<td>German/English</td>
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Mandatory

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<th>Course Title</th>
<th>Credits</th>
<th>Grading scale</th>
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<tbody>
<tr>
<td>T-WIWI-111028</td>
<td>Introduction to Machine Learning</td>
<td>4.5 CR</td>
<td>Geyer-Schulz, Nazemi</td>
<td></td>
</tr>
<tr>
<td>T-WIWI-111029</td>
<td>Introduction to Neural Networks and Genetic Algorithms</td>
<td>4.5 CR</td>
<td>Geyer-Schulz</td>
<td></td>
</tr>
</tbody>
</table>

Competence Certificate
The module examination is carried out in the form of partial examinations of the selected courses of the module, with which in total the minimum requirement of credit points is fulfilled. The kind of examination is described in detail for each course of this module.

Prerequisites
None

Competence Goal
The student
- knows the main families of machine learning methods, their basic principles, assumptions and restrictions.
- can use these methods to solve data analysis problems, to support decision making or for process automation in companies and use the solutions interpreted and evaluated accordingly.
- can compare and evaluate the performance of solutions.

Content
The module mainly focuses on methods from statistical learning (linear and logistic learning, regression, tree methods, SVMs, and shrinkage estimators) and from the field of neural and genetic procedures were presented. Furthermore, data transformations and representations (e.g. dimension reduction, clustering, imputation in case of missing data) and visualization techniques and appropriate inference, diagnosis and validation techniques are presented.

Workload
Total effort for 9 credit points: approx. 270 hours. The allocation is based on the credit points of the courses of the module.
7.43 Module: Machine Tools and Industrial Handling [M-MACH-101286]

**Responsible:** Prof. Dr.-Ing. Jürgen Fleischer

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** Engineering Sciences (Specialisation Program Engineering Sciences)  
Compulsory Elective Modules (Business Administration oder Engineering Sciences)  
Compulsory Elective Modules (Engineering Sciences)

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<tr>
<td>9</td>
<td>Grade to a tenth</td>
<td>Each winter term</td>
<td>1 term</td>
<td>German</td>
<td>4</td>
<td>5</td>
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</table>

**Mandatory**

| T-MACH-110963 | Machine Tools and High-Precision Manufacturing Systems | 9 CR | Fleischer |

**Competence Certificate**

Oral exam (45 minutes)

**Prerequisites**

None

**Competence Goal**

The students

- are able to assess the use and application of machine tools and high-precision manufacturing systems and to differentiate between them in terms of their characteristics and design.
- can describe and discuss the essential elements of machine tools and high-precision manufacturing systems (frame, main spindle, feed axes, peripheral equipment, control unit).
- are able to select and dimension the essential components of machine tools and high-precision manufacturing systems.
- are capable of selecting and evaluating machine tools and high-precision manufacturing systems according to technical and economic criteria.

**Content**

The module gives an overview of the construction, use and application of machine tools and high-precision manufacturing systems. In the course of the module a well-founded and practice-oriented knowledge for the selection, design and evaluation of machine tools and high-precision manufacturing systems is conveyed. First, the main components of the systems are systematically explained and their design principles as well as the integral system design are discussed. Subsequently, the use and application of machine tools and high-precision manufacturing systems will be demonstrated using typical machine examples. Based on examples from current research and industrial applications, the latest developments are discussed, especially concerning the implementation of Industry 4.0 and artificial intelligence.

Guest lectures from industry round off the module with insights into practice.

The individual topics are:

- Structural components of dynamic manufacturing Systems
- Feed axes: High-precision positioning
- Spindles of cutting machine Tools
- Peripheral Equipment
- Machine control unit
- Metrological Evaluation
- Maintenance strategies and condition Monitoring
- Process Monitoring
- Development process for machine tools and high-precision manufacturing Systems
- Machine examples

**Workload**

regular attendance: 63 hours
self-study: 207 hours

**Learning type**

Lecture, exercise, excursio
Module: Management Accounting [M-WIWI-101498]

Responsible: Prof. Dr. Marcus Wouters
Organisation: KIT Department of Economics and Management
Part of: Business Administration (Specialisation Program Business Administration) Compulsory Elective Modules (Business Administration oder Engineering Sciences) Compulsory Elective Modules (Business Administration)

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<th>Credits</th>
<th>Grading scale</th>
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<td>Each term</td>
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Mandatory

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<th>Credits</th>
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<th>Recurrence</th>
<th>Duration</th>
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<tr>
<td>T-WIWI-102800</td>
<td>Management Accounting 1</td>
<td>4.5</td>
<td>CR</td>
<td>Each term</td>
<td>2 terms</td>
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<td>T-WIWI-102801</td>
<td>Management Accounting 2</td>
<td>4.5</td>
<td>CR</td>
<td>Each term</td>
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<td>English</td>
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</table>

Competence Certificate
The assessment is carried out as partial exams (according to Section 4 (2), 13 SPO) of the courses of this module. The assessment procedures are described for each course of the module separately. The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Competence Goal
Students
- are familiar with various management accounting methods,
- can apply these methods for cost estimation, profitability analysis, and product costing,
- are able to analyze short-term and long-decisions with these methods,
- have the capacity to devise instruments for organizational control.

Content
The module consists of two courses "Management Accounting 1" and "Management Accounting 2". The emphasis is on structured learning of management accounting techniques.

Annotation
The following courses are part of this module:
- The course Management Accounting 1, which is offered in every summer semester
- The course Management Accounting 2, which is offered in every winter semester

Workload
The total workload for this module is approximately 270 hours. For further information see German version.
7.45 Module: Management and Marketing [M-WIWI-105768]

Responsible: Prof. Dr. Martin Klarmann
Prof. Dr. Hagen Lindstädt
Prof. Dr. Petra Nieken
Prof. Dr. Orestis Terzidis

Organisation: KIT Department of Economics and Management

Part of: Business Administration (mandatory)

Credits: 5
Grading scale: Grade to a tenth
Recurrence: Each winter term
Duration: 1 term
Language: German
Level: 3
Version: 2

Competence Certificate
The module examination is in written form on the two courses "Management" and "Marketing". The examination is offered at the beginning of each lecture-free period. Repeat examinations are possible at any regular examination date.

Competence Goal
The student
- has basic knowledge of central issues in business administration,
- has an understanding of problems, interrelationships and solutions in strategic management,
- is able to analyze and evaluate central areas of activity, functions and decisions in a company operating in a market economy,
- has an overview of important marketing-relevant questions and well-founded approaches to their solution.

With the knowledge acquired in the three basic business administration modules, the prerequisites are created in the area of business administration to expand this knowledge in the specialization program.

Content
An understanding of the basic functions of managing businesses is provided. In addition, the basics of marketing are taught.

Workload
Total workload required for 5 credit points: approx. 150 hours
Module: Manufacturing Technology [M-MACH-101276]

**Responsible:** Prof. Dr.-Ing. Volker Schulze  
**Organisation:** KIT Department of Mechanical Engineering

**Part of:**  
- Engineering Sciences (Specialisation Program Engineering Sciences)  
- Compulsory Elective Modules (Business Administration oder Engineering Sciences)  
- Compulsory Elective Modules (Engineering Sciences)

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<th>Duration</th>
<th>Language</th>
<th>Level</th>
<th>Version</th>
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<td>Grade to a tenth</td>
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**Mandatory**

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<th>Credits</th>
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<tbody>
<tr>
<td>T-MACH-102105</td>
<td>Manufacturing Technology</td>
<td>9</td>
<td>Grade to a tenth</td>
<td>Each winter term</td>
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<td>German</td>
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<td>5</td>
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</table>

**Competence Certificate**  
Written Exam (180 min)

**Prerequisites**  
None

**Competence Goal**  
The students

- can name different manufacturing processes, can describe their specific characteristics and are capable to depict the general function of manufacturing processes and are able to assign manufacturing processes to the specific main groups.  
- are enabled to identify correlations between different processes and to select a process depending on possible applications.  
- are capable to describe the theoretical basics for the manufacturing processes they got to know within the scope of the course and are able to compare the processes.  
- are able to correlate based on their knowledge in materials science the processing parameters with the resulting material properties by taking into account the microstructural effects.  
- are qualified to evaluate different processes on a material scientific basis.

**Content**  
Within this engineering sciences-oriented module the students will get to learn principle aspects of manufacturing technology. Further information can be found at the description of the lecture "Manufacturing Technology".

**Workload**  
regular attendance: 63 hours  
self-study: 207 hours

**Learning type**  
Lectures, exercise, excursion
Competence Certificate
The assessment of the module is carried out by a written examination (150 min) about the lecture Materials Science [2125760] (according to Section 4(2), 1 of the examination regulation).

The examination is offered every semester. Re-examinations are offered at every ordinary examination date. The examination at the end of the summer term is carried out by a written or oral exam.

The grade of the module corresponds to the grade of this examination.

Prerequisites
None.

Competence Goal
Students are able to specify the basics of materials science and engineering and can apply it to simple problems in various technical areas.

As major part of the module, the students know the correlation between atomic structure and bonding of solids and the macroscopic properties such as mechanical behavior or electrical conductivity. They have basic knowledge with respect to materials characterization. The students are able to analyze phase diagrams with up to two components and can derive simple correlations among composition, processing, microstructure evolution and materials properties.

Content
After an introduction to the atomic structure and interatomic bonding, elementary concepts of crystallography are given. Different types of crystal structures are explained and various types of imperfections in solids. Then, the mechanical behaviour and the physical properties of various types of materials (metals, polymers, ceramics) are discussed. The thermodynamic principles of solidification and the basic types of phase diagrams are given to understand to iron-carbon phase diagram and the manifold microstructures of steel and cast iron.

Workload
The total workload for this module is approximately 90 hours.
Module: Mathematics 1 [M-MATH-105754]

**Responsible:** Prof. Dr. Günter Last  
**Organisation:** KIT Department of Mathematics  
**Part of:** Mathematics

<table>
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<td>Grade to a tenth</td>
<td>Each winter term</td>
<td>1 term</td>
<td>German</td>
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**Mandatory**

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<td>T-MATH-111492</td>
<td>Mathematics I - Midterm Exam</td>
<td>5 CR Hug, Last, Nestmann, Winter</td>
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<td>T-MATH-111493</td>
<td>Mathematics I - Final Exam</td>
<td>5 CR Hug, Last, Nestmann, Winter</td>
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</table>

**Competence Certificate**

The assessment consists of two written exams of 90 min each (in accordance with §4(2), 1 of the examination regulations). The first (midterm) exam takes place after half of the course, the second (final) exam takes place shortly after the end of the lectures. Auxiliary means such as literature or calculators are not allowed.

Resit exams for both exams are offered in the first weeks of the subsequent semester. Both resit exams will take place on the same day.

Candidates who have not passed the corresponding midterm or final exam, as well as those who have not yet taken a first attempt, will be eligible for the resit exams.

Oral re-examinations (in accordance with §9(1) of the examination regulations) for the midterm or final exam take place as individual examinations.

Both the midterm and final exams must be passed individually.

**Competence Goal**

Students

- are confident with basic terms and definitions of mathematical language (propositions, sets, number systems, mappings, etc.),
- have a basic knowledge of differentiable calculus for functions of a single variable,
- know basic concepts of matrix theory,
- have a basic knowledge of integral calculus in a single variable.

**Content**

The course Mathematics 1 is the first part of the three semester basic training in higher mathematics. Topics are

- Propositional logic and basic set theory,
- Combinatorics and principles of counting,
- Number systems and basic arithmetics,
- Convergence of sequences and series,
- Continuous functions,
- Differentiable functions,
- Power series and special functions,
- Taylor’s theorem,
- Riemann integral,
- n-dimensional vector spaces,
- Systems of linear equations,
- Scalar product, length and angle,
- Linear mappings and matrices,

**Module grade calculation**

The examination mark for Mathematics 1 is the average of the marks obtained in the midterm exam and final exam.

**Workload**

Work load: 300 hours (10 ETCS)  
Classes: 150 hours  
Preparation of courses and examinations: 150 hours
Recommendation
There are no Prerequisites. We strongly recommend to attend the three maths courses in the order Mathematics 1, Mathematics 2, Mathematics 3.

Literature
There are no Prerequisites. We strongly recommend to attend the three maths courses in the order Mathematics 1, Mathematics 2, Mathematics 3.
Module: Mathematics 2 [M-MATH-105756]

Responsible: Prof. Dr. Günter Last
Organisation: KIT Department of Mathematics
Part of: Mathematics

<table>
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<th>Credits</th>
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<td>Each summer term</td>
<td>1 term</td>
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Competence Certificate
The assessment consists of two written exams of 60 min each (in accordance with §4(2), 1 of the examination regulations). The first (midterm) exam takes place after half of the course, the second (final) exam takes place shortly after the end of the lectures. Auxiliary means such as literature or calculators are not allowed.

Resit exams for both exams are offered in the first weeks of the subsequent semester. Both resit exams will take place on the same day.

Candidates who have not passed the corresponding midterm or final exam, as well as those who have not yet taken a first attempt, will be eligible for the resit exams.

Oral re-examinations (in accordance with §9(1) of the examination regulations) for the midterm or final exam take place as individual examinations.

Both the midterm and final exams must be passed individually.

Competence Goal
Students
- have a basic knowledge of determinants and eigenvalue theory,
- have a basic knowledge of multivariate differential calculus,
- have a basic knowledge of integrals of functions in several variables

Content
The course Mathematics 2 is the second part of the three semester basic training in higher mathematics. Topics are
- Determinants,
- Eigenvalue theory,
- Multivariate calculus,
- Multiple integrals.

Module grade calculation
The examination mark for Mathematics 2 is the average of the marks obtained in the midterm exam and final exam.

Workload
Work load: 210 hours (7 ETCS)
Classes: 120 hours
Preparation of courses and examinations: 90 hours

Recommendation
There are no Prerequisites. We strongly recommend to attend the three maths courses in the order Mathematics 1, Mathematics 2, Mathematics 3.
Module: Mathematics 3 [M-MATH-105757]

**Responsible:** Prof. Dr. Günter Last  
**Organisation:** KIT Department of Mathematics  
**Part of:** Mathematics

<table>
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<td>1 term</td>
<td>German</td>
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</table>

**Mandatory**

| T-MATH-111498 | Mathematics III - Final Exam | 4 CR | Hug, Last, Nestmann, Winter |

**Competence Certificate**

The assessment consists of a written exam of 75 min (in accordance with §4(2), 1 of the examination regulations). The exam takes place shortly after the end of the lectures. Auxiliary means such as literature or calculators are allowed.

A resit exam is offered in the first weeks of the subsequent semester.

Candidates who have not passed the exam, as well as those who have not yet taken a first attempt, will be eligible for the resit exam.

Oral re-examinations (in accordance with §8(2) of the examination regulations) for the written exam take place as individual examinations.

**Competence Goal**

Students

- are confident with important concepts in the theory of normed vector spaces,
- have some basic knowledge of ordinary differential equations,
- have some basic knowledge of Fourier analysis.

**Content**

The course Mathematics 3 is the third part of the three semester basic training in higher mathematics. Topics are

- Normed spaces,
- Banach's fixed point theorem,
- Ordinary differential equations,
- Linear differential equations,
- Fourier analysis,
- Integral transformations.

**Module grade calculation**

The examination mark for Mathematics 3 is the mark of the written exam.

**Workload**

Work load: 120 hours (4 ETCS)  
Classes: 60 hours  
Preparation of courses and examinations: 60 hours

**Recommendation**

There are no Prerequisites. We strongly recommend to attend the three maths courses in the order Mathematics 1, Mathematics 2, Mathematics 3.
M 7.51 Module: Measurement, Control, and Manufacturing Measurement Technology [M-ETIT-106581]

Responsibilities: Prof. Dr.-Ing. Michael Heizmann
Prof. Dr.-Ing. Sören Hohmann

Organisation: KIT Department of Electrical Engineering and Information Technology

Part of: Engineering Sciences (Specialisation Program Engineering Sciences)
Compulsory Elective Modules (Business Administration oder Engineering Sciences)
Compulsory Elective Modules (Engineering Sciences)

Credits 9
Grading scale Grade to a tenth
Recurrence Each summer term
Duration 1 term
Language German
Level 3
Version 1

Mandatory
T-ETIT-112852 Measurement and Control Technology 6 CR Heizmann, Hohmann
T-ETIT-106057 Manufacturing Measurement Technology 3 CR Heizmann

Competence Certificate

MRT:
The success control takes place in the form of a written examination of 120 minutes.

FMT:
The success control takes place in the form of a written examination of 90 minutes. If there are less than 20 examinees, an oral examination of approx. 20 minutes can be taken as an alternative. The module grade is the grade of the written or oral examination.

Prerequisites
none

Competence Goal

MRT:
- Students have a sound knowledge of the theoretical fundamentals of measurement technology, including scaling of measured quantities, the SI system of units, model building for measurement systems, description and treatment of systematic and stochastic measurement deviations, obtaining and linearizing measurement characteristics and propagation of measurement uncertainties.
- Students master the procedure for the basic design of measurement systems, taking into account the above knowledge.
- Students are able to analyze tasks in measurement technology, synthesize possible solutions for measurement systems and assess the properties of the solution obtained.
- The aim is to teach the basics of control engineering, therefore students are able to recognize and work on basic control engineering problems. They know the relevant technical terms.
- Students are able to formally describe real processes and to derive requirements for control structures in the time and image domain for fixed value and sequential control systems.
- Students are able to analyze the dynamics of systems using graphical and algebraic methods.
- Students will be able to name controller design methods for single-loop, single-variable systems. They will be able to design perfect closed-loop and open-loop control systems.
- They can perform design steps using the Nyquist criterion and the Wurzelortz curve.
- Students can name structures for disturbance compensation, of multi-loop control loops and two degrees of freedom structures and perform design steps for them.
- Students can digitize closed-loop and open-loop controls designed in the image domain using fast sampling design.
- Students are familiar with computer-aided design procedures and can carry out substeps in them.

FMT:
- Students have sound knowledge of fundamentals, methods and procedures for measuring and testing in industrial manufacturing.
- Students are able to evaluate different measuring principles, methods and devices with regard to their prerequisites, characteristics, areas of application and results.

Students are able to analyze production measurement tasks, derive the resulting requirements for a suitable metrological implementation, find suitable metrological implementations and point out the resulting properties of the measurement result....
Content

MRT:

- Description of measured quantities
  - Metric quantities and their properties
  - SI system of units
- Structure of measuring systems
- Measurement deviations
  - Systematic and stochastic deviations
- Curve fitting
  - Interpolation
  - Approximation
- Characteristic curves and their errors
  - Linearization of characteristic curves
  - Treatment of disturbance variables
- Uncertainty propagation
  - Error propagation
  - Guide to the Expression of Uncertainty in Measurement (GUM)
- Basic concepts of control engineering
  - Control loops
  - Control structures
  - Embedding in automation structures
- Description of systems in time and image domain
  - State space representation
  - Derivation of an I/O representation
  - Signal flow diagrams and control loop elements
  - Realization of controllers (analog and digital)
- Analysis of control loops in time and image domain
  - Stationary accuracy
  - Stability
  - Dynamics (bandwidth)
  - Robustness
- Design of single loop control loops
  - Perfect control
  - Design with the Nyquist criterion
  - Root locus curve
  - Heuristics
- Design of extended control loop structures
  - disturbance compensation
  - Meshing
  - Two degrees of freedom structure

FMT:

Manufacturing metrology plays an essential role in ensuring efficient industrial manufacturing. To a certain extent, it represents the sensory organs for quality assurance and automation technology and encompasses all activities associated with measurement and testing.

Based on the methodological fundamentals, which are the subject of the compulsory lecture "Measurement Technology", the lecture teaches procedures and implementations for measurement and testing in industrial practice. The focus is on geometric properties; most of the concepts presented can also be applied to other properties. Sensor systems for the measurement of geometric properties are presented and discussed with their characteristic properties.

The contents include in detail:

- Fundamentals of FMT
  - Basic terms, definitions
  - Dimensional standards
  - Measurement uncertainties
- Measurement technology in operation and in the measuring room
  - Coordinate metrology
  - Form and position metrology
  - Surface and contour metrology
  - Comparators
  - Micro and nano metrology
  - Measuring rooms
- Production-oriented metrology
  - Measuring equipment and gauges
  - Measuring devices
  - Measuring in the machine
  - Visual inspection
• Statistical process control (SPC)
• Optical/non-contact measuring methods
  • Integratable optical sensors
  • Stand-alone optical measurement systems
  • Optical 2.5D coordinate measuring technology
  • Optical 3D coordinate metrology
  • Computed tomography
  • System integration and standardization
• Gauge management
  • Significance and correlations
  • Controlled inspection processes
• Inspection planning

Module grade calculation
The module grade is the average of both examination grades weighted by credit points.

Workload
MRT:
Total: approx. 180h, of which
1. Attendance time in lectures and exercises: 60h
2. Preparation and follow-up of the lectures and exercises: 60 hours
3. Exam preparation and presence in the same: 60h

FMT:
Total: approx. 90h, of which
1. attendance time in lectures: 23h
2. preparation of lectures: 23h
3. exam preparation and presence in the exam: 44h

Recommendation
MRT:
Knowledge of “Signale und Systeme” is helpful.

FMT:
Knowledge of stochastics and fundamentals of measurement techniques is helpful.
7.52 Module: Mechanical Design [M-MACH-101299]

**Responsible:** Prof. Dr.-Ing. Sven Matthiesen

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** Compulsory Elective Modules (Engineering Sciences)

<table>
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<td>Grade to a tenth</td>
<td>Each winter term</td>
<td>2 terms</td>
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**Mandatory**

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<th>Credits</th>
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<td>Mechanical Design I and II</td>
<td>7 CR</td>
<td>Matthiesen</td>
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<td>T-MACH-112226</td>
<td>Mechanical Design I, Tutorial</td>
<td>1 CR</td>
<td>Matthiesen</td>
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<tr>
<td>T-MACH-112227</td>
<td>Mechanical Design II, Tutorial</td>
<td>1 CR</td>
<td>Matthiesen</td>
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</table>

**Competence Certificate**

Written examination on the contents of Mechanical Design I&II

**Duration:** 90 min plus reading time

**Preliminary examination:** Successful participation in the preliminary work in the field of Mechanical Design I&II

**Prerequisites**

None
Competence Goal
Learning object springs:

- be able to recognize spring types and explain stress
- identify and describe the properties of a resilient LSS in machine elements presented later on
- understanding and explaining the principle of action
- know and list areas of application for springs
- graphically illustrate the load and the resulting stresses
- be able to describe the degree of species usefulness as a means of lightweight construction
- be able to analyse different solution variants with regard to lightweight construction (use species efficiency)
- being able to explain several springs as a circuit and calculate total spring stiffness

Learning objects Technical Systems:

- being able to explain what a technical system is
- "thinking in systems."
- using system technology as an abstraction tool for handling complexity
- recognizing functional relationships of technical systems
- getting to know the concept of function
- be able to use C&C^2-A as a means of system technology

Learning objects Visualization:

- ability to create and interpret schematics
- using freehand technical drawing as a means of communication
- to be able to apply the technical basics of freehand drawing
- derivation of 2D representations into different perspective representations of technical structures and vice versa
- master reading of technical drawings
- dedicated dimensioning of technical drawings
- create sectional views of technical systems as a technical sketch

Learning objects Bearings:

- be able to recognize bearings in machine systems and explain their basic functions
- name bearings (type/type/function) and recognize them in machine systems and technical drawings
- being able to name areas of application and selection criteria for the various bearings and bearing arrangements and explain interrelationships
- ability to functionally explain the design of the bearing definitions in different directions radially/axially and circumferentially
- know and describe selection as an iterative process as an example
- be able to perform dimensioning of bearing arrangements as an example of the engineer's approach to dimensioning machine elements
- develop first ideas for probabilities in predicting the life of machine elements
- recognise from the damage pattern whether static or dynamic overload was the cause of material failure
- calculate equivalent static and dynamic bearing loads from the catalogue and given external forces on the bearing
- being able to name, explain and transfer the basic equation of the dimensioning to the bearing dimensioning

Learning objectives seals:

The students...

- can discuss the basic functions of seals
- can describe the physical causes for mass transfer
- can apply the C&C-Model on seals
- can name, describe and apply the three most important classification criteria of seals
- can explain the function of a contacting seal and a non-contacting seal.
- can differentiate the seal types and organize them to the classification criteria
- can discuss the structure and the effect of a radial shaft seal
- can evaluate radial shaft seals, compression packings, mechanical seals, gap seals and labyrinth seals
- can describe and apply the constructional principle of selffortification
- can describe the stick-slip phenomenon during the movement sequences of a reciprocating seal

Learning design:

The students...

- understand the meaning of design
- are able to recognize and implement basic rules and principles of design
- are able to design the connection of partial systems into the total system
- can name requirements of design and take them into account
- know the main groups of manufacturing methods
are able to explain the manufacturing processes
are able to depict a casted design in a drawing clearly, e.g. draft of the mold, no material accumulation, ...
know how components are designed
Know how the production of the components has an effect on
their design
Know the requirements and boundary conditions on design

Learning bolted connections:
The students...

can list and explain various bolt applications.
can recognize bolt types and explain their function
can build a C&C² model of a bolted joint and discuss the influences on its function
can explain the function of a bolted connection with the help of a spring model
can reproduce, apply and discuss the screw equation.
Can estimate the load-bearing capacity of low-loaded bolted joints for dimensioning purposes
Can indicate which bolted joint is to be calculated and which only roughly dimensioned.
Can carry out the dimensioning of bolted connections as flange connections
Can create, explain and discuss the force deflection diagram of a bolted connection

Content
MKL I:
Introduction to product development
Tools for visualization (technical drawing)
Product creation as a problem solution
Technical Systems Product Development

Systems theorie
Contact and Channel Approach C&C²-A

Basics of selected construction and machine elements
Federn
bearings and fence
sealings

The lecture is accompanied by exercises with the following content:
gear workshop
Tools for visualization (technical drawing)
Technical Systems Product Development

Systemtheorie
Contact and Channel Approach C&C²-A

Exercises for springs
Exercises for bearings and fence

MKL II:

sealings
design
dimensioning
component connections
bolts
**Workload**

**MKL1:**
- **Presence:** 33.5 h
- Attendance in lectures: \(15 \times 1.5\ h = 22.5\ h\)
- Presence in exercises: \(8 \times 1.5\ h = 12\ h\)
- **Self-study:** 56.5 h
- Personal preparation and wrap-up of lecture and exercises including the processing of the test certificates and preparation for the exam: 56.5 h
- **Total:** 90 h = 3 LP

**MKL2:**
- **Presence:** 33 h
- Attendance in lectures: \(15 \times 1.5\ h = 22.5\ h\)
- Presence in exercises: \(7 \times 1.5\ h = 10.5\ h\)
- **Self-study:** 87 h
- Personal preparation and wrap-up of lectures and exercises, including the processing of the test certificates and preparation for the exam: 87 h
- **Total:** 150 h = 5 LP

**Additional expenditure for degree programs from other disciplines MKL1 + MKL2 in total:** 30 h = 1 LP

**Recommendation**
An in-depth study of machine design (parts 3 + 4) can be carried out as part of the "Extracurricular Module in Engineering".

**Learning type**
- Lecture
- Tutorial
- Project work during the semester
- Online-test
### 7.53 Module: Mechanical Design A [M-MACH-106527]

**Responsible:** Prof. Dr.-Ing. Tobias Düser  
Prof. Dr.-Ing. Sven Matthiesen

**Organisation:** KIT Department of Electrical Engineering and Information Technology  
KIT Department of Mechanical Engineering

**Part of:**  
Engineering Sciences (Specialisation Program Engineering Sciences)  
Compulsory Elective Modules (Business Administration oder Engineering Sciences)

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<td>Mechanical Design A</td>
<td>7 CR</td>
<td>Grade to a tenth</td>
<td>Each winter term</td>
<td>German</td>
<td>3</td>
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<td>T-MACH-112981</td>
<td>Mechanical Design A, Workshop</td>
<td>2 CR</td>
<td>Grade to a tenth</td>
<td>Each winter term</td>
<td>German</td>
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</table>

#### Competence Certificate
See individual courses

#### Prerequisites
None

#### Competence Goal
In mechanical design, students acquire skills in analysis and synthesis using examples. These include both individual machine elements such as bearings or springs and more complicated systems such as gears or couplings. After completing the machine design theory, the students are able to apply the contents learned to other technical systems - even those not known from the lecture - by transferring the principles of action and basic functions learned from examples to other contexts. This enables students to independently analyze unknown technical systems and synthesize suitable systems for given problems.

#### Content
**MD A**
- Springs
- Technical Systems
- Bearings
- Sealings
- Component Joints
- Gears

#### Module grade calculation
The module grade ist the grade of the written exam.

#### Annotation
None

#### Workload
**MKL A:** Total workload: 270 h, thereof attendance 75 h, divided into lecture + exercise: 4 SWS -> 60 h as well as workshop: 1 SWS -> 15 h; self-study 195 h

#### Recommendation
None

#### Learning type
Lectures, exercises and semester-long workshops as well as project work

#### Literature
oder Volltextzugriff über Uni-Katalog der Universitätsbibliothek

Grundlagen von Maschinenelementen für Antriebsaufgaben; Steinhilper, Sauer, Springer Verlag, ISBN 3-540-29629-8
Base for
None
Module: Mechatronic Product Design [M-MACH-106236]

**Responsible:** Prof. Dr.-Ing. Sören Hohmann
Prof. Dr.-Ing. Sven Matthiesen

**Organisation:**
KIT Department of Mechanical Engineering

**Part of:**
- Engineering Sciences (Specialisation Program Engineering Sciences)
- Compulsory Elective Modules (Engineering Sciences)

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<tr>
<td>T-MACH-112647</td>
<td>Mechatronical Systems and Products (mach/etit/wiwi)</td>
<td>4 CR</td>
<td>Hohmann, Matthiesen</td>
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<tr>
<td>T-MACH-112648</td>
<td>Workshop Mechatronical Systems and Products (mach/etit/wiwi)</td>
<td>5 CR</td>
<td>Hohmann, Matthiesen</td>
</tr>
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</table>

**Competence Certificate**
Success is monitored within the framework of an written examination (60 minutes) and an alternative academic achievement.

**Prerequisites**
None

**Competence Goal**
The students

- are able to describe the difficulties of interdisciplinary projects.
- are able to coordinate processes, structures, responsibilities and interfaces within a project.
- know different solutions for mechanic/electric problems.
- know the elements of the treated product development processes, are able to describe different views onto them and execute them.
- know the model based systems engineering approaches.
- know the basic principles of virtual design and are able to apply the methods of virtual system design.
- are able to identify the differences between virtuality and reality.
- are able to recognize the advantages of early validation.
- Students are able to understand and apply model description with Bond graphs and generalized system elements.
- Students are able to synthesize and analyze multi-domain models.
- Students are able to apply parameter identification methods.

**Content**
The lecture provides the theoretic basics, which will be applied and enhanced in development project during the semester. The project will take part in small groups, where the students have to organize and distribute the tasks on their own. In the project work - the workshop Mechatronical Systems and Products - they work on a development task in teams. This involves various development phases, from the development of technical solution concepts to the development and validation of virtual prototypes and physical functional prototypes.

**Module grade calculation**
The module grade is composed in equal parts of the grades of the module's sub-services.

**Annotation**
All relevant content (scripts, exercise sheets, etc.) for the course can be obtained via the eLearning platform ILIAS. To participate in the course, please complete the survey "Anmeldung und Gruppeneinteilung" in ILIAS before the start of the semester.

**Workload**
1. Time of presence lecture: 17 * 1.5 h = 25.5 h
2. Prepare/follow-up lecture: 17 * 1.5 h = 25.5 h
3. Time of presence exercise + workshop: 4 * 1.5h + 12 * 7h = 90 h
4. Prepare/follow-up exercise: 4 * 1.5h = 6 h
5. Exam preparation and time of presence: 33 h
Total: 180 h = 6 LP
**Recommendation**
It is recommended not to take this module with other time-consuming workshops, such as MD, at the same time.

**Learning type**
Lecture, exercise and project work

**Literature**

Module: Methodical Foundations of OR [M-WIWI-101414]

Responsible: Prof. Dr. Oliver Stein
Organisation: KIT Department of Economics and Management
Part of: Operations Research (Specialisation Program Operations Research)

Compulsory Elective Modules (Operations Research)

<table>
<thead>
<tr>
<th>Credits</th>
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<th>Recurrence</th>
<th>Duration</th>
<th>Level</th>
<th>Version</th>
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<td>9</td>
<td>Grade to a tenth</td>
<td>Each term</td>
<td>1 term</td>
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Compulsory Elective Courses (Election: at least 1 item as well as between 4,5 and 9 credits)

<table>
<thead>
<tr>
<th>Code</th>
<th>Course</th>
<th>Credits</th>
<th>Grade</th>
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<tbody>
<tr>
<td>T-WIWI-102726</td>
<td>Global Optimization I</td>
<td>4,5 CR</td>
<td>Stein</td>
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<tr>
<td>T-WIWI-103638</td>
<td>Global Optimization I and II</td>
<td>9 CR</td>
<td>Stein</td>
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<tr>
<td>T-WIWI-102724</td>
<td>Nonlinear Optimization I</td>
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<td>T-WIWI-103637</td>
<td>Nonlinear Optimization I and II</td>
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</table>

Supplementary Courses (Election: )

<table>
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<tr>
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<td>4,5 CR</td>
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<td>Global Optimization II</td>
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<td>T-WIWI-102704</td>
<td>Facility Location and Strategic Supply Chain Management</td>
<td>4,5 CR</td>
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Competence Certificate
The assessment is carried out as partial written exams (according to Section 4(2), 1 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Prerequisites
At least one of the courses Nonlinear Optimization I [2550111] and Global Optimization I [2550134] has to be examined.

Competence Goal
The student

- names and describes basic notions for optimization methods, in particular from nonlinear and from global optimization,
- knows the indispensable methods and models for quantitative analysis,
- models and classifies optimization problems and chooses the appropriate solution methods to solve also challenging optimization problems independently and, if necessary, with the aid of a computer,
- validates, illustrates and interprets the obtained solutions.

Content
The modul focuses on theoretical foundations as well as solution algorithms for optimization problems with continuous decision variables. The lectures on nonlinear programming deal with local solution concepts, whereas the lectures on global optimization treat approaches for global solutions.

Annotation
The planned lectures and courses for the next three years are announced online (http://www.ior.kit.edu).

Workload
The total workload for this module is approximately 270 hours. For further information see German version.

Recommendation
The courses Introduction to Operations Research I and II are helpful.
### Module: Microsystem Technology [M-MACH-101287]

- **Responsible:** Prof. Dr. Jan Gerrit Korvink
- **Organisation:** KIT Department of Mechanical Engineering

#### Credits: 9

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<td>3</td>
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<td>T-MACH-102152</td>
<td>Novel Actuators and Sensors</td>
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<td>6</td>
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<td>T-MACH-111807</td>
<td>Introduction to Bionics</td>
<td>3</td>
<td>CR</td>
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#### Competence Certificate

The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the core course and further single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

#### Prerequisites

none

#### Competence Goal

Construction and production of e.g. mechanical, optical, fluidic and sensory microsystems.

#### Content

The module offers courses in microsystem technology. Knowledge is imparted in various fields like basics in construction and production of e.g. mechanical, optical, fluidic and sensory microsystems.

#### Workload

270 hours
7.57 Module: Mobile Machines [M-MACH-101267]

**Responsible:** Prof. Dr.-Ing. Marcus Geimer
**Organisation:** KIT Department of Mechanical Engineering

**Part of:**
- Engineering Sciences (Specialisation Program Engineering Sciences)
- Compulsory Elective Modules (Business Administration oder Engineering Sciences)
- Compulsory Elective Modules (Engineering Sciences)

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**Mobile Machines (Election: at least 1 credit)**

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<tr>
<td>T-MACH-105307</td>
<td>Drive Train of Mobile Machines</td>
<td>4 CR</td>
<td>Geimer, Wydra</td>
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<tr>
<td>T-MACH-105311</td>
<td>Design and Development of Mobile Machines</td>
<td>4 CR</td>
<td>Geimer, Siebert</td>
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<tr>
<td>T-MACH-108887</td>
<td>Design and Development of Mobile Machines - Advance</td>
<td>0 CR</td>
<td>Geimer, Siebert</td>
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<tr>
<td>T-MACH-102093</td>
<td>Fluid Power Systems</td>
<td>5 CR</td>
<td>Geimer</td>
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<td>T-MACH-111389</td>
<td>Fundamentals in the Development of Commercial Vehicles</td>
<td>3 CR</td>
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<td>T-MACH-105172</td>
<td>Simulation of Coupled Systems</td>
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<td>T-MACH-108888</td>
<td>Simulation of Coupled Systems - Advance</td>
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<td>T-MACH-111821</td>
<td>Control of Mobile Machines</td>
<td>4 CR</td>
<td>Becker, Geimer</td>
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<tr>
<td>T-MACH-111820</td>
<td>Control of Mobile Machines – Prerequisites</td>
<td>0 CR</td>
<td>Becker, Geimer</td>
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</table>

**Competence Certificate**
The assessment is carried out as a general oral exam (duration approx. 60 mins) (according to Section 4(2), 2 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module.

The examination is offered every semester. Re-examinations are offered at every ordinary examination date.

The overall grade of the module is the grade of the oral examination.

The assessment may be carried out as partial oral exams (according to Section 4(2), 2 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. In this case the overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

The assessment procedures are described for each course of the module separately.

**Prerequisites**
Successful passing of the corresponding modules of the basic program.

**Competence Goal**
The student

- knows and understands the basic structure of the machines
- masters the basic skills to develop the selected machines

**Content**
In the module of Mobile Machines [WI4INGMB15] the students will learn the structure of the machines and deepen the knowledge of the subject for developing the machines. After conclusion the module the student will know the latest developments in mobile machines and is able to evaluate the concepts and the trends of developments. The module is practically orientated and supported by industry partners.

**Workload**
The total workload for this module is approximately 270 hours. For further information see German version.

**Recommendation**
Knowledge of Fluid Power Systems are helpful, otherwise it is recommended to take the course Fluid Power Systems [2114093].
7.58 Module: Mobility and Infrastructure [M-BGU-101067]

**Responsible:** Prof. Dr.-Ing. Peter Vortisch

**Organisation:** KIT Department of Civil Engineering, Geo and Environmental Sciences

**Part of:**
- Engineering Sciences (Specialisation Program Engineering Sciences)
- Compulsory Elective Modules (Business Administration oder Engineering Sciences)
- Compulsory Elective Modules (Engineering Sciences)

<table>
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<td>T-BGU-101791</td>
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<td>9 CR</td>
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**Prerequisites**
none

**Annotation**
none

**Recommendation**
For students from the KIT-Department of Economics and Management it is recommended to take part in the exercises.
7.59 Module: Module Bachelor's Thesis [M-WIWI-101601]

**Competence Certificate**
The Bachelor Thesis is a written exam which shows that the student can autonomously investigate a scientific problem in Industrial Engineering and Management. The Bachelor Thesis is described in detail in § 11 (SPO 2007) and § 14 (SPO 2015) of the examination regulation. The review is carried out

- according to SPO 2007 by at least one examiner of the Department of Economics and Management, or, after approval by at least one examiner of another faculty. The examiner has to be involved in the degree programme. Involved in the degree programme are the persons that coordinate a module or a lecture of the degree programme.
- according to SPO 2015 by at least two examiners of the Department of Economics and Management.

The regular processing time takes three/six months (SPO 2007/SPO2015). On a reasoned request of the student, the examination board can extend the processing time of a maximum of on month. If the Bachelor Thesis is not completed in time, this exam is “failed”, unless the student is not being responsible (eg maternity leave).

With consent of the examiner the thesis can be written in English as well. Other languages require besides the consent of the examiner the approval of the examination board. The issue of the Bachelor Thesis may only returned once and only within the first month of processing time. A new topic has to be released within four weeks.

The overall grade of the module is the grade of the Bachelor Thesis.

**Prerequisites**
Prerequisites for admission to the Bachelor Thesis:

- according to SPO 2007: the student is in the 3rd Academic year (5th and 6th semester) and has not been completed at most one of the exams of the basic program.
- according to SPO 2015: A minimum of 120 credits must be earned. All module examinations of the basic program must be passed.

At the request of the student, the examination committee decides on exceptions to these regulations.

It is recommended to begin the Bachelor Thesis in the 5th or 6th Semester. A written confirmation of the examiner about supervising the Bachelor's Thesis is required. Please pay regard to the institute specific rules for supervising a Bachelor Thesis. The Bachelor Thesis has to contain the following declaration: "I hereby declare that I produced this thesis without external assistance, and that no other than the listed references have been used as sources of information. Passages taken literally or analogously from published or non published sources are marked as this." If this declaration is not given, the Bachelor Thesis will not be accepted.

**Competence Goal**
The student can independently work on a relevant topic in accordance with scientific criteria within the specified time frame. He/she is in a position to research, analyze the information, abstract and identify basic principles and regulations from less structured information.

He/she reviews the task ahead, can select scientific methods and techniques and apply them to solve a problem or identify further potential. This is basically also done under consideration of social and/or ethical aspects.

He/she can interpret, evaluate and if required, graphically present the obtained results.

He/she is in a position to clearly structure a research paper and communicate in writing using the technical terminology.
Content
The Bachelor Thesis is the first major scientific work. The topic of the Bachelor Thesis will be chosen by the student themselves and adjusted with the examiner. The topic has to be related to Industrial Engineering and Management and has to refer to subject-specific or interdisciplinary problems.

Workload
The total workload for this module is approximately 360 hours. For further information see German version.
**7.60 Module: Optimization under Uncertainty [M-WIWI-103278]**

**Responsible:** Prof. Dr. Steffen Rebennack

**Organisation:** KIT Department of Economics and Management

**Part of:**
- Operations Research (Specialisation Program Operations Research)
- Compulsory Elective Modules (Operations Research)

**Compulsory Elective Courses (Electon: between 1 and 2 items)**

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<tbody>
<tr>
<td>T-WIWI-106546</td>
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**Supplementary Courses (Electon: at most 1 item)**

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<tr>
<td>T-WIWI-102724</td>
<td>Nonlinear Optimization I</td>
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<td>T-WIWI-102714</td>
<td>Tactical and Operational Supply Chain Management</td>
<td>4,5 CR</td>
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**Competence Certificate**

The assessment is carried out as partial exams (according to § 4(2), 1 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module.

The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

**Prerequisites**

At least one of the courses *Introduction to Stochastic Optimization* and *Optimization approaches under uncertainty* has to be taken.

**Competence Goal**

The student

- denominates and describes basic notions for optimization methods under uncertainty, in particular from stochastic optimization,
- knows the indispensable methods and models for quantitative analysis,
- models and classifies optimization problems under uncertainty and chooses the appropriate solution methods to solve also challenging optimization problems independently and, if necessary, with the aid of a computer,
- validates, illustrates and interprets the obtained solutions, in particular of stochastic optimization problems.

**Content**

The module focuses on modeling and analyzing mathematical optimization problems where certain data is not fully present at the time of decision-making. The lectures on the introduction to stochastic optimization deal with methods to integrate distribution information into the mathematical model. The lectures on the optimization approaches under uncertainty offer alternative approaches such as robust optimization.

**Annotation**

The curriculum, planned for three years in advance, can be found on the Internet at http://sop.ior.kit.edu/28.php.

**Workload**

The total workload of the module is about 240 hours. The workload is proportional to the credit points of the individual courses.

**Recommendation**

Knowledge from the lectures "Introduction to Operations Research I" and "Introduction to Operations Research II" are helpful.
### 7.61 Module: Power Network [M-ETIT-102379]

**Responsible:** Dr.-Ing. Bernd Hoferer  
Prof. Dr.-Ing. Thomas Leibfried

**Organisation:** KIT Department of Electrical Engineering and Information Technology

**Part of:** Engineering Sciences (Specialisation Program Engineering Sciences) (Usage until 9/30/2024)  
Compulsory Elective Modules (Business Administration oder Engineering Sciences) (Usage until 9/30/2024)  
Compulsory Elective Modules (Engineering Sciences) (Usage until 9/30/2024)

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<td>T-ETIT-101923</td>
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<td>T-ETIT-100830</td>
<td>Power Network</td>
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### 7.62 Module: Preliminary Exam [M-WIWI-100950]

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<td>5 CR</td>
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<td>Puppe, Reiß</td>
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<td>T-WIWI-102737</td>
<td>Statistics I</td>
<td>5 CR</td>
<td></td>
<td></td>
<td>Grothe, Schienle</td>
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</table>

**Modelled deadline**
This module must be passed until the end of the 3. term.

**Prerequisites**
None

**Annotation**

For students who are or were enrolled in a degree program in the summer semester 2020, winter semester 2020/2021, summer semester 2021, or winter semester 2021/2022, the deadline for taking the orientation exam has been extended by one semester in each case (section 32 (5 a), sentence 1 LHG).

This means that the deadline has been extended for:
- students enrolled in one of the above semesters in the same program by one semester;
- students enrolled in two of the above semesters in the same program by two semesters;
- students enrolled in three or more of the above semesters in the same program by a maximum of three semesters.
7.63 Module: Product Lifecycle Management [M-MACH-101270]

**Responsible:** Prof. Dr.-Ing. Jivka Ovtcharova  
**Organisation:** KIT Department of Mechanical Engineering

**Part of:**  
- Engineering Sciences (Specialisation Program Engineering Sciences)  
- Compulsory Elective Modules (Business Administration oder Engineering Sciences)  
- Compulsory Elective Modules (Engineering Sciences)

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<th>Recurrence</th>
<th>Duration</th>
<th>Language</th>
<th>Level</th>
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<td>Each term</td>
<td>2 terms</td>
<td>German</td>
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**Product Lifecycle Management (Kernbereich) (Election: 1 item)**

<table>
<thead>
<tr>
<th>Module Code</th>
<th>Module Name</th>
<th>Credits</th>
<th>Grade</th>
<th>Responsible</th>
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<tr>
<td>T-MACH-105147</td>
<td>Product Lifecycle Management</td>
<td>4</td>
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**Product Lifecycle Management (Election: at least 5 credits)**

<table>
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<tr>
<th>Module Code</th>
<th>Module Name</th>
<th>Credits</th>
<th>Grade</th>
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<tbody>
<tr>
<td>T-MACH-102187</td>
<td>CAD-NX Training Course</td>
<td>2</td>
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<tr>
<td>T-MACH-111283</td>
<td>Development Methods of Technical Systems</td>
<td>4</td>
<td>CR</td>
<td>Maier, Ovtcharova</td>
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<tr>
<td>T-MACH-102209</td>
<td>Information Engineering</td>
<td>3</td>
<td>CR</td>
<td>Ovtcharova</td>
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<tr>
<td>T-MACH-106457</td>
<td>I4.0 Systems Platform</td>
<td>4</td>
<td>CR</td>
<td>Maier, Ovtcharova</td>
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<tr>
<td>T-MACH-102153</td>
<td>PLM-CAD Workshop</td>
<td>4</td>
<td>CR</td>
<td>Ovtcharova</td>
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<tr>
<td>T-MACH-102155</td>
<td>Product, Process and Resource Integration in the Automotive Industry</td>
<td>4</td>
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<td>Mbang</td>
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<tr>
<td>T-MACH-102083</td>
<td>Integrated Information Systems for Engineers</td>
<td>4</td>
<td>CR</td>
<td>Ovtcharova</td>
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<tr>
<td>T-MACH-102149</td>
<td>Virtual Reality Practical Course</td>
<td>4</td>
<td>CR</td>
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</table>

**Competence Certificate**
The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

**Prerequisites**
None

**Competence Goal**
The students should:

- have basic knowledge about the challenges in product and process data management regarding the whole product lifecycle;  
- have understanding about challenges and functional concepts of product lifecycle management;  
- be able to rudimental operate common PLM/CAx/VR - systems;  
- develop and present prototype solutions in teams of different domains.

**Content**
Product Lifecycle Management (PLM), Generation and management of information, Architecture and functionality of information systems, Industry 4.0, CAx and VR-systems.

**Workload**
270 hours

**Learning type**
Lectures, Tutorials
7.64 Module: Production Engineering [M-MACH-106590]

Responsible: Prof. Dr.-Ing. Volker Schulze
Organisation: KIT Department of Mechanical Engineering
Part of: Engineering Sciences (Specialisation Program Engineering Sciences)
Compulsory Elective Modules (Business Administration oder Engineering Sciences)
Compulsory Elective Modules (Engineering Sciences)

<table>
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<td>Each term</td>
<td>2 terms</td>
<td>German</td>
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Production Engineering (Election: at least 9 credits)

- T-MACH-110176 Digitalization from Production to the Customer in the Optical Industry 4 CR Wawerla
- T-MACH-110991 Global Production 4 CR Lanza
- T-MACH-110981 Tutorial Global Production 1 CR Lanza
- T-MACH-105188 Integrative Strategies in Production and Development of High Performance Cars 4 CR Schlichtenmayer
- T-MACH-112115 Artificial Intelligence in Production 5 CR Fleischer
- T-MACH-105783 Learning Factory "Global Production" 6 CR Lanza
- T-MACH-108878 Laboratory Production Metrology 5 CR Lanza, Stamer
- T-MACH-110318 Product- and Production-Concepts for Modern Automobiles 4 CR Kienzle, Steegmüller
- T-MACH-110984 Production Technology for E-Mobility 4 CR Fleischer
- T-MACH-110960 Project Internship Additive Manufacturing: Development and Production of an Additive Component 4 CR Zanger
- T-MACH-102107 Quality Management 4 CR Lanza
- T-MACH-112121 Seminar Application of Artificial Intelligence in Production 4 CR Fleischer
- T-MACH-105185 Control Technology 4 CR Gönnheimer
- T-MACH-105177 Metal Forming 4 CR Herlan
- T-MACH-102148 Gear Cutting Technology 4 CR Klaiber

Competence Certificate
Oral exams: duration approx. 5 min per credit point
Written exams: duration approx. 20 - 25 min per credit point
Amount, type and scope of the success control can vary according to the individually choice.

Prerequisites
The module M-MACH-101284 - Production Technology must not have been started.

Competence Goal
The students
- are able to apply the methods of production science to new problems.
- are able to analyze and evaluate the suitability of the methods, procedures and techniques for a specific problem.
- are able to use their knowledge target-oriented to achieve an efficient production technology.
- are able to analyze new situations and choose methods of production science target-oriented based on the analyses, as well as justifying their selection.
- are able to describe and compare complex production processes exemplarily.

Content
Within this module the students will get to know and learn about production science. Manifold lectures and excursions as part of several lectures provide specific insights into the field of production science.

Workload
The work load is about 270 hours, corresponding to 9 credit points.
Learning type
Lectures, seminars, workshops, excursions
7.65 Module: Production, Logistics and Information Systems [M-WIWI-105770]

Responsible:  
Prof. Dr. Wolf Fichtner  
Prof. Dr. Andreas Geyer-Schulz  
Prof. Dr. Alexander Mädche  
Prof. Dr. Stefan Nickel  
Prof. Dr. Frank Schultmann  
Prof. Dr. Christof Weinhardt

Organisation:  
KIT Department of Economics and Management

Part of:  
Business Administration (mandatory)

<table>
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</table>

Competence Certificate
The module examination is in written form. The examination is offered at the beginning of each lecture-free period. Repeat examinations are possible at any regular examination date.

Competence Goal
The student

- has basic knowledge of the interaction of information technologies, people and organizational structures,
- is familiar with the structures of information systems,
- masters the essential concepts, theories and methods of production management,
- has an understanding of problems, interrelationships and solutions of logistics processes of enterprises.

With the knowledge acquired in the three basic modules BWL, the prerequisites are created in the area of BWL to expand this knowledge in the specialization program.

Content
The basics of business informatics are taught. In addition, the area of production management and logistics is introduced.

Workload
Total workload required for 5 credit points: approx. 150 hours
7.66 Module: Public and Civil Law [M-INFO-105084]

**Responsible:** N.N.

**Organisation:** KIT Department of Informatics

**Part of:** Compulsory Elective Modules (Law or Sociology)

<table>
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**Mandatory**

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<tr>
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<td>Civil Law for Beginners</td>
<td>5 CR</td>
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<td>T-INFO-110300</td>
<td>Public Law I &amp; II</td>
<td>6 CR</td>
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<td>Each term</td>
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**Competence Certificate**

The assessment is carried out as partial written exams (according to Section 4(2), 1 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The examinations take place in every semester. Re-examinations are offered at every ordinary examination date. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

**Prerequisites**

None

**Workload**

See German version.
7.67 Module: Public Finance [M-WIWI-101403]

Responsible: Prof. Dr. Berthold Wigger
Organisation: KIT Department of Economics and Management
Part of: Economics (Specialisation Program Economics)

Compulsory Elective Modules (Economics)

<table>
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<tr>
<th>Credits</th>
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Compulsory Elective Courses (Elective: 9 credits)

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<th>Course</th>
<th>Title</th>
<th>Credits</th>
<th>Lecturer</th>
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<td>T-WIWI-102877</td>
<td>Introduction to Public Finance</td>
<td>4,5 CR</td>
<td>Wigger</td>
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<tr>
<td>T-WIWI-108711</td>
<td>Basics of German Company Tax Law and Tax Planning</td>
<td>4,5 CR</td>
<td>Gutekunst, Wigger</td>
</tr>
<tr>
<td>T-WIWI-102739</td>
<td>Public Revenues</td>
<td>4,5 CR</td>
<td>Wigger</td>
</tr>
<tr>
<td>T-WIWI-112721</td>
<td>Public Economics</td>
<td>4,5 CR</td>
<td>Wigger</td>
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</table>

Competence Certificate
The assessment is carried out as partial written exams (according to Section 4(2), 1 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The exams are offered at the beginning of the recess period about the subject matter of the latest held lecture. Re-examinations are offered at every ordinary examination date. The assessment procedures are described for each course of the module separately.

The overall grade for the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Competence Goal
See German version.

Content
As a branch of Economics, Public Finance is concerned with the theory and policy of the public sector and its interrelations with the private sector. It analyzes the economic role of the state from a normative as well as from a positive point of view. The normative view examines efficiency- and equity-oriented motives for government intervention and develops fiscal policy guidelines. The positive view explains the actual behavior of economic agents in public sector affairs. Special fields of Public Finance are public revenues, i.e. taxes and public debt, public expenditures for publicly provided goods, and welfare programs.

Annotation
The course T-WIWI-102790 "Specific Aspects in Taxation" will no longer be offered in the module as of winter semester 2018/2019.

Workload
The total workload for this module is approximately 270 hours. For further information see German version.

Recommendation
It is recommended to attend the course 2560129 after having completed the course 2560120.
### 7.68 Module: Rail System Technology [M-MACH-101274]

**Responsible:** Prof. Dr.-Ing. Martin Cichon  
**Organisation:** KIT Department of Mechanical Engineering

**Part of:**  
- Engineering Sciences (Specialisation Program Engineering Sciences)  
- Compulsory Elective Modules (Business Administration oder Engineering Sciences)  
- Compulsory Elective Modules (Engineering Sciences)

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</table>

#### Mandatory

| T-MACH-102143 | Rail System Technology | 9 CR | Cichon |

**Competence Certificate**  
Oral examination  
Duration: ca. 45 minutes  
No tools or reference materials may be used during the exam.

**Competence Goal**

- The students understand relations and interdependencies between rail vehicles, infrastructure and operation in a rail system.  
- Based on operating requirements and legal framework they derive the requirements concerning a capable infrastructure and suitable concepts of rail vehicles.  
- They recognize the impact of alignment, understand the important function of the wheel-rail-contact and estimate the impact of driving dynamics on the operating program.  
- They evaluate the impact of operating concepts on safety and capacity of a rail system.  
- They know the infrastructure to provide power supply to rail vehicles with different drive systems.  
- The students learn the role of rail vehicles and understand their classification. They understand the basic structure and know the functions of the main systems. They understand the overall tasks of vehicle system technology.  
- They learn functions and requirements of car bodies and judge advantages and disadvantages of design principles. They know the functions of the car body’s interfaces.  
- They know about the basics of running dynamics and bogies.  
- The students learn about advantages and disadvantages of different types of traction drives and judge, which one fits best for each application.  
- They understand brakes from a vehicular and an operational point of view. They assess the fitness of different brake systems.  
- They know the basic setup of train control management system and understand the most important functions.  
- They specify and define suitable vehicle concepts based on requirements for modern rail vehicles.
Content

1. Railway System: railway as system, subsystems and interdependencies, definitions, laws, rules, railway and environment, economic impact
2. Operation: Transportation, public transport, regional transport, long-distance transport, freight service, scheduling
3. Infrastructure: rail facilities, track alignment, railway stations, clearance diagram
4. Wheel-rail-contact: carrying of vehicle mass, adhesion, wheel guidance, current return
5. Vehicle dynamics: tractive and brake effort, driving resistance, inertial force, load cycles
6. Signaling and Control: operating procedure, succession of trains, European Train Control System, blocking period, automatic train control
7. Traction power supply: power supply of rail vehicles, comparison electric traction and diesel traction, dc and ac networks, system pantograph and contact wire, filling stations
8. Vehicle system technology: structure and main systems of rail vehicles
9. Car body: functions, requirements, design principles, crash elements, coupling, doors and windows
10. Bogies: forces, running gears, bogies, Jakobs-bogies, active components, connection to car body, wheel arrangement
11. Drives: principles, electric drives (main components, asynchronous traction motor, inverter, with DC supply, with AC supply, without line supply, multisystem vehicles, dual mode vehicles, hybrid vehicles), non-electric drives
12. Brakes: basics, principles (wheel brakes, rail brakes, blending), brake control (requirements and operation modes, pneumatic brake, electropneumatic brake, emergency brake, parking brake)
13. Train control management system: definition of TCMS, bus systems, components, network architectures, examples, future trends

Annotation

A bibliography is available for download (Ilias-platform).
The lectures can be attended in the same term.

Workload

1. Regular attendance: 42 hours
2. Self-study: 42 hours
3. Exam and preparation: 186 hours

Learning type

Lectures
7.69 Module: Seminar Module [M-WIWI-101816]

Responsibility: Studiendekan des KIT-Studienganges
Organisation: KIT Department of Economics and Management
Part of: Compulsory Elective Modules (mandatory)

<table>
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Compulsory Elective Courses (Election: 3 credits)

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<tr>
<th>Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Lecturers</th>
</tr>
</thead>
<tbody>
<tr>
<td>T-WIWI-103486</td>
<td>Seminar in Business Administration (Bachelor)</td>
<td>3 CR</td>
<td>Professorenschaft des Betriebswirtschaftslehre</td>
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<tr>
<td>T-WIWI-103485</td>
<td>Seminar in Informatics (Bachelor)</td>
<td>3 CR</td>
<td>Professorenschaft des Instituts AIFB</td>
</tr>
<tr>
<td>T-WIWI-108763</td>
<td>Seminar in Engineering Science Master (approval)</td>
<td>3 CR</td>
<td>Fachverterter ingenieurwissenschaftlicher Fakultäten</td>
</tr>
<tr>
<td>T-MATH-102265</td>
<td>Seminar in Mathematics (Bachelor)</td>
<td>3 CR</td>
<td>Folkers, Last</td>
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<tr>
<td>T-WIWI-103488</td>
<td>Seminar in Operations Research (Bachelor)</td>
<td>3 CR</td>
<td>Nickel, Rebennack, Stein</td>
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<tr>
<td>T-INFO-101997</td>
<td>Seminar: Legal Studies I</td>
<td>3 CR</td>
<td>N.N.</td>
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<tr>
<td>T-WIWI-103489</td>
<td>Seminar in Statistics (Bachelor)</td>
<td>3 CR</td>
<td>Grothe, Schienle</td>
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<td>3 CR</td>
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<tr>
<td>T-MACH-102135</td>
<td>Conveying Technology and Logistics</td>
<td>3 CR</td>
<td>Furmans, Pagani</td>
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<tr>
<td>T-MACH-109062</td>
<td>Seminar Production Technology</td>
<td>3 CR</td>
<td>Fleischer, Lanza, Schulze</td>
</tr>
<tr>
<td>T-MACH-108737</td>
<td>Seminar Data-Mining in Production</td>
<td>3 CR</td>
<td>Lanza</td>
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Competence Certificate

SPO 2015: The modul examination consists of one seminar (according to §4 (3), 3 of the examintaion regulation). A detailed description of the assessment is given in the specific course characterization.

SPO 2007: The modul examination consists of two seminars and of at least one key qualification (KQ) course (according to §4 (3), 3 of the examintaion regulation). As key qualification one of the following courses must be chosen: Academic Learning HoC (2-3 credits), Key Qualifikations ZAK (1-3 credits), Elective „Educational development for student teachers“ (2-3 credits) or language courses SpZ. A detailed description of every singled assessment is given in the specific course characterization.

Prerequisites
All modules of the basic program should be completed. For further information see German version.

Competence Goal

- Students are able to independently deal with a defined problem in a specialized field based on scientific criteria.
- They are able to research, analyze the information, abstract and derive basic principles and regularities from unstructured information.
- They can solve the problems in a structured manner using their interdisciplinary know-how.
- They know how to validate the obtained results.
- Finally, they are able to logically and systematically present the results both orally and in written form in accordance with scientific guidelines (structuring, technical terminology, referencing). They can argue and defend the results professionally in the discussion.
- Students are familiar with the DFG’s Code of Conduct “Guidelines for Safeguarding Good Research Practice” and base their scientific work on it.
Content
Competences which are gained in the seminar module especially prepare the student for composing the final thesis. Within the term paper and the presentation the student exercises himself in scientific working techniques supported by the supervisor. Beside advancing skills in techniques of scientific working there are gained integrative key qualifications as well. A detailed description of these qualifications is given in the section “Key Qualifications” of the module handbook. Furthermore, the module also includes additional key qualifications provided by the KQ-courses.

Annotation
The listed seminar titles are placeholders. Currently offered seminars of each semester will be published on the websites of the institutes and in the course catalogue of the KIT. In general, the current seminar topics of each semester are already announced at the end of the previous semester. Furthermore for some seminars there is an application required. The available places are listed on the internet: https://portal.wiwi.kit.edu.

Workload
See German version.
### 7.70 Module: Signals and Systems [M-ETIT-106372]

**Responsible:** Dr.-Ing. Mathias Kluwe
Prof. Dr.-Ing. Sander Wahls

**Organisation:** KIT Department of Electrical Engineering and Information Technology

**Part of:**
- Engineering Sciences (Specialisation Program Engineering Sciences)
- Compulsory Elective Modules (Business Administration oder Engineering Sciences)
- Compulsory Elective Modules (Engineering Sciences)

<table>
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<td>German</td>
<td>3</td>
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</table>

**Mandatory**

| T-ETIT-112860 | Signals and Systems | 7 CR | Kluwe, Wahls |
| T-ETIT-112861 | Signals and Systems - Workshop | 2 CR | Kluwe, Wahls |

**Competence Certificate**
The assessment of success takes place in the form of a written examination lasting 120 minutes. In addition, the completion of the written work in the workshop is a prerequisite for passing the module.

**Prerequisites**
none

**Competence Goal**
The students master the basics, properties and calculation rules of the Laplace transformation and can apply these to solve linear differential equations.

- The students are able to use the Laplace transformation to describe time-continuous dynamic systems.
- The students know some basics of complex analysis in the context of integral transformations such as Laurent expansion and theorem of residuals.
- The students know the complex inverse formula of the Laplace transformation and can use it for complicated image functions.
- The students know the two-sided Laplace transformation and master the basics, properties and calculation rules of the Fourier transformation.
- Students can use the Fourier transformation to describe time-continuous signals in the frequency domain.
- Students are familiar with the sampling theorem for converting time-continuous into time-discrete signals and can use the discrete Fourier transform to describe time-discrete signals in the frequency domain.
- The students are familiar with the basics, properties and calculation rules of the z-transformation.
- Students can use the z-transformation to describe time-discrete systems.
Content

- Laplace transform
  - Motivation and Definition
  - Properties and Examples
- Laplace transform of ordinary differential equations
  - Ordinary and generalized differentiation rule
  - Laplace transform of general linear differential equations with constant coefficients
  - Back transformation via the partial fraction decomposition of rational functions
  - Calculation rules of the Laplace transform (1):
    - Integration rule and damping rule
  - Back transformation over the convolution rule of the Laplace transformation
  - Calculation rules of the Laplace transform (2):
    - Displacement rules and limit theorems
- Characterization of the transfer behavior of dynamic systems with transfer and weight function
- Function theory: Laurent expansion, residual and residual theorem
- Complex inversion formula of the Laplace transformation
  - Derivation of the complex inverse formula
  - Calculation of the complex inverse integral
- Two-sided Laplace Transform and Fourier Transform
  - Two-sided Laplace Transform
  - Definition and properties of the Fourier transform
  - Calculation rules and correspondences of the Fourier transform
- z-Transform
  - Definition, properties and calculation rules of the z-transform
  - Use for the solution of difference equations
- Mathematical basics: Spaces
- Time-continuous signals
  - Fourier series
  - Fourier transform
  - Test signals
  - General signal properties
- Continuous-time systems
  - Properties
  - System description by differential equations
  - Laplace transform
  - System function
  - Frequency selective filters
- Discrete-Time Signals
  - Fourier transform of discrete-time signals
  - Sampling theorem
  - Discrete Fourier Transform
- Discrete-Time Systems
  - Properties
  - System description by difference equations
  - The z-transform
  - System function
  - Discrete-time representation of continuous systems
  - Frequency selective filters

Module grade calculation
The module grade is the grade of the written exam.

Workload
Total approx. 240h, of which

- Attendance time in lectures and exercises: 75h
- Preparation/ad-hoc of the lectures and exercises: 130h
- Exam preparation and presence in the same: 40h
- Preparation time for the workshop: 5h
- Presence time in the workshop: 15h
- Preparation of the protocol for the workshop: 5h

Total: 270 LP = 9 LP
Recommendation
Knowledge of HM3 is helpful.
7.71 Module: Sociology/Empirical Social Research [M-GEISTSOZ-101167]

**Responsible:** Prof. Dr. Gerd Nollmann  
**Organisation:** KIT Department of Humanities and Social Sciences  
**Part of:** Compulsory Elective Modules (Law or Sociology)

<table>
<thead>
<tr>
<th>Credits</th>
<th>Grading scale</th>
<th>Recurrence</th>
<th>Duration</th>
<th>Language</th>
<th>Level</th>
<th>Version</th>
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<tbody>
<tr>
<td>9</td>
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<td>Each winter term</td>
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**Mandatory**

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<tr>
<td>T-GEISTSOZ-109047</td>
<td>Analasis of Social Structurs (WiWi)</td>
<td>3 CR</td>
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</table>

**Competence Goal**

The student

- Gains theoretical and methodical knowledge of social processes and structures
- Is able to apply acquired knowledge practically
- Is able to present work results in a precise and clear way

**Content**

This module offers students the possibility to get to know research problems and to answer these theoretically as well as empirically. For example: Who does earn how much in his job and why? How do subcultures emerge? Why are boys' grades in school always worse than those of girls? Do divorces have negative influences on the development of children? How does mass consumption influence the individual? Is there a world society emerging? In addition, this module contains courses on sociological methods that are essential to answer such questions scientifically.

The lecture on social structure analysis gives an overview of large social structures such as the education system, labour market, institutions, demography, etc. for Germany and in international comparison. The content of the social research seminars is determined individually by the lecturers. Students are free to choose one seminar each for Social Research A/B.
Module: Specialization in Customer Relationship Management [M-WIWI-101422]

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<tr>
<th>Credits</th>
<th>Grading scale</th>
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### Mandatory

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<tr>
<td>T-WIWI-102597</td>
<td>Operative CRM</td>
<td>4.5</td>
<td>Geyer-Schulz</td>
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### Supplementary Courses (Election: 1 item)

<table>
<thead>
<tr>
<th>Module Code</th>
<th>Module Name</th>
<th>CR</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>T-WIWI-102596</td>
<td>Analytical CRM</td>
<td>4.5</td>
<td>Geyer-Schulz</td>
</tr>
<tr>
<td>T-WIWI-109938</td>
<td>Digital Services</td>
<td>4.5</td>
<td>Satzger, Weinhardt</td>
</tr>
<tr>
<td>T-WIWI-100005</td>
<td>Competition in Networks</td>
<td>4.5</td>
<td>Misch</td>
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</table>

### Competence Certificate

This module will be offered for the last time in winter semester 2019/20.

The assessment is carried out as partial exams (according to Section 4(1), S. 2 2nd clause of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

### Prerequisites

The course "Operative CRM" is compulsory.

It is only possible to choose this module in combination with the module CRM and Servicemanagement. The module is passed only after the final partial exam of CRM and Servicemanagement is additionally passed.

### Competence Goal

The student

- knows the scientific methods (from business administration, statistics, informatics) which are most relevant for analytic CRM and he autonomously applies these methods to standard cases,
- gains an overview of the market for CRM software,
- designs, implements, and analyzes operative CRM processes in concrete application domains (e.g. campaign management, call center management,...),
- is aware of the problems of protecting the privacy of customers and the implications of privacy law.

### Content

In this module, analysis methods and techniques for the management and improvement of customer relations are presented. Furthermore, modelling, implementation, introduction, change, analysis and valuation of operative CRM processes are treated. Regarding the first part, we teach analysis methods and techniques suitable for the management and improvement of customer relations. For this goal we treat the principles of customer- and service-oriented management as the foundation of successful customer relationship management. In addition, we show how knowledge of the customer can be used for decision-making at an aggregate level (e.g. planning of sortiments, analysis of customer loyalty, ...). A basic requirement for this is the integration and collection of data from operative processes in a suitably defined data-warehouse in which all relevant data is kept for future analysis. The process of transferring data from the operative systems into the data warehouse is known as the ETL process (Extract / Transform / Load). The process of modelling a data-warehouse as well as the so-called extraction, transformation, and loading process for building and maintaining a data-warehouse are discussed in-depth. The data-warehouse serves as a base for flexible management reporting. In addition, various statistic methods (e.g. cluster analysis, regression analysis, stochastic models, ...) are presented which help in computing suitable key performance indicators or which support decision-making.

Regarding the operative part, we emphasize the design of operative CRM processes. This includes the modelling, implementation, introduction and change, as well as the analysis and evaluation of operative CRM processes. Petri nets and their extensions are the scientific foundation of process modelling. The link of Petri nets to process models used in industry as e.g. UML activity diagrams is presented. In addition, a framework for process innovation which aims at a radical improvement of key business processes is introduced. The following application areas of operative CRM processes are presented and discussed:

- Strategic marketing processes
- Operative marketing processes (campaign management, permission marketing, ...)
- Customer service processes (sales force management, field services, call center management, ...)

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Industrial Engineering and Management B.Sc.
Module Handbook as of 04/10/2023

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**Workload**
The total amount of work for this module is approximately 270 hours (9 credits). The subdivision is based on the credits of the courses of the module.
The total number of hours per course results from the time of visiting the lectures and exercises, as well as from the exam periods and the time that is required to achieve the objectives of the module as an average student with an average performance.
Module: Statistics and Econometrics [M-WIWI-101599]

**Responsible:** Prof. Dr. Oliver Grothe
Prof. Dr. Melanie Schienle

**Organisation:** KIT Department of Economics and Management

**Part of:**
- Economics (Specialisation Program Economics)
- Compulsory Elective Modules (Economics)
- Compulsory Elective Modules (Statistics)

<table>
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<th>Credits</th>
<th>Grading scale</th>
<th>Recurrence</th>
<th>Duration</th>
<th>Language</th>
<th>Level</th>
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<tr>
<td>5</td>
<td>Economics III: Introduction in Econometrics</td>
<td>5 CR</td>
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**Supplementary Courses (Election: between 1 and 2 items)**

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<td>4.5</td>
<td>Financial Econometrics</td>
<td>4.5 CR</td>
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<td>4.5</td>
<td>Financial Econometrics II</td>
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<td>4.5</td>
<td>Microeconometrics</td>
<td>4.5 CR</td>
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<tr>
<td>4.5</td>
<td>Statistical Modeling of Generalized Regression Models</td>
<td>4.5 CR</td>
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</table>

**Competence Certificate**

The assessment is carried out as partial written exams (according to Section 4(2), 1 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The examinations are offered every semester. Re-examinations are offered at every ordinary examination date. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

**Prerequisites**

The course „Economics III: Introduction in Econometrics“ is compulsory and must be examined. In case the course „Economics III: Introduction in Econometrics“ has already been examined within the module „Applied Microeconomics“, the course „Economics III: Introduction in Econometrics“ is not compulsory.

**Competence Goal**

The student

- shows an advanced understanding of Econometric techniques and statistical model building.
- is able to develop Econometric models for applied problems based on available data
- is able to apply techniques and models with statistical software, to interpret results and to judge on different approaches with appropriate statistical criteria.

**Content**

The courses provide a solid Econometric and statistical foundation of techniques necessary to conduct valid regression, time series and multivariate analysis.

**Workload**

The total workload for this module is approximately 270 hours.
7.74 Module: Statistics and Econometrics II [M-WIWI-105414]

**Responsible:** Prof. Dr. Melanie Schienle
**Organisation:** KIT Department of Economics and Management
**Part of:** Economics (Specialisation Program Economics)
Compulsory Elective Modules (Economics)
Compulsory Elective Modules (Statistics)

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<th>Recurrence</th>
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<th>Language</th>
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<td>Grade to a tenth</td>
<td>Each term</td>
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**Compulsory Elective Courses (Election: )**

<table>
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Instructor</th>
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<tr>
<td>T-WIWI-103063</td>
<td>Analysis of Multivariate Data</td>
<td>4,5 CR</td>
<td>Grothe</td>
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<tr>
<td>T-WIWI-103064</td>
<td>Financial Econometrics</td>
<td>4,5 CR</td>
<td>Schienle</td>
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<tr>
<td>T-WIWI-110939</td>
<td>Financial Econometrics II</td>
<td>4,5 CR</td>
<td>Schienle</td>
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<tr>
<td>T-WIWI-112153</td>
<td>Microeconometrics</td>
<td>4,5 CR</td>
<td>Krüger</td>
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<tr>
<td>T-WIWI-103065</td>
<td>Statistical Modeling of Generalized Regression Models</td>
<td>4,5 CR</td>
<td>Heller</td>
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</table>

**Competence Certificate**
The assessment is carried out as partial exams of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module.
The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

**Prerequisites**
The following module must have been started: Statistics and Econometrics [M-WIWI-101599].

**Competence Goal**
The student
- shows an advanced understanding of Econometric techniques and statistical model building,
- is able to develop advanced Econometric models for applied problems based on available data
- is able to apply techniques and models efficiently with statistical software, to interpret results and to judge on different approaches with appropriate statistical criteria.

**Content**
The courses provide foundations of advanced Econometric and statistical techiques for regression, time series and multivariate analysis.

**Workload**
The total workload for this module is approximately 270 hours.
7.75 Module: Strategy and Organization [M-WIWI-101425]

**Responsible:** Prof. Dr. Hagen Lindstädt

**Organisation:** KIT Department of Economics and Management

**Part of:**
- Business Administration (Specialisation Program Business Administration)
- Compulsory Elective Modules (Business Administration oder Engineering Sciences)
- Compulsory Elective Modules (Business Administration)

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<th>Credits</th>
<th>Grading scale</th>
<th>Recurrence</th>
<th>Duration</th>
<th>Language</th>
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<td>Each term</td>
<td>2 terms</td>
<td>German</td>
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**Strategy and Organization (Elective: at least 9 credits)**

<table>
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<th>Course Name</th>
<th>Credits</th>
<th>Lecturer</th>
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<tr>
<td>T-WIWI-102630</td>
<td>Managing Organizations</td>
<td>3.5 CR</td>
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<tr>
<td>T-WIWI-102871</td>
<td>Problem Solving, Communication and Leadership</td>
<td>2 CR</td>
<td>Lindstädt</td>
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<tr>
<td>T-WIWI-113090</td>
<td>Strategic Management</td>
<td>3.5 CR</td>
<td>Lindstädt</td>
</tr>
</tbody>
</table>

**Competence Certificate**

Erfolgreicher Abschluss aller fachlich entsprechenden Module aus dem Grundlagenprogramm.

**Competence Goal**

- The student can prepare strategic decisions along the ideal-typical strategy process and classify them strategically.
- He/she evaluates the strengths and weaknesses of existing organizational structures and regulations using systematic criteria and can review the management of organizational change.
- The student can effectively carry out decision-making by structuring problems and communicating solutions, taking into account the situation and the personalities involved.
- Through intensive exposure to a variety of practice-relevant case studies, students learn to apply and discuss theoretical course content to real-life situations.

**Content**

The module has a practical and action-oriented structure. Students become familiar with central frameworks of strategic management along the ideal-typical strategy process. An overview of fundamental models will be given, and an action-oriented integration performance will be achieved through the transfer of theory to practical issues. In addition, students learn concepts for the design of organizational structures, regulation of organizational processes as well as control of organizational changes. This enables a well-founded assessment of existing organizational structures and regulations. Furthermore, participants are enabled to recognize, structure, analyze and effectively communicate problems. In addition, central leadership concepts are taught that address the influence of the situation, the leadership personality and the characteristics of those being led.

**Workload**

The total workload of the module is about 240 hours. The workload is proportional to the credit points of the individual courses.
Module: Supply Chain Management [M-WIWI-101421]

7.6 Module: Supply Chain Management [M-WIWI-101421]

**Responsible:** Prof. Dr. Stefan Nickel  
**Organisation:** KIT Department of Economics and Management  
**Part of:** Compulsory Elective Modules (Business Administration oder Engineering Sciences) 
Compulsory Elective Modules (Business Administration)

<table>
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**Mandatory**

- T-WIWI-107506 Platform Economy 4.5 CR Weinhardt

**Supplementary Courses (Election: 1 item)**

- T-WIWI-102704 Facility Location and Strategic Supply Chain Management 4.5 CR Nickel
- T-WIWI-102714 Tactical and Operational Supply Chain Management 4.5 CR Nickel

**Competence Certificate**

This module is only available in the elective field. In the specialization program Business Administration, the election is not permitted.

The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

**Prerequisites**

The course T-WIWI-107506 "Platform Economy" has to be taken.

**Competence Goal**

The students

- are able to understand and evaluate the control of cross-company supply chains based on a strategic and operative view,
- are able to analyse the coordination problems within the supply chains,
- are able to identify and integrate adequate information system infrastructures to support the supply chains,
- are able to apply theoretical methods from the operations research and the information management,
- learn to elaborate solutions in a team

**Content**

The module "Supply Chain Management" gives an overview of the mutual dependencies of information systems and of supply chains spanning several enterprises. The specifics of supply chains and their information needs set new requirements for the operational information management. In the core lecture "Platform Economy" the focus is set on markets between two parties that act through an intermediary on an Internet platform. Topics discussed are network effects, peer-to-peer markets, blockchains and market design. The course is held in English and teaches parts of the syllabus with the support of a case study in which students analyze a platform.

The module is completed by an elective course addressing appropriate optimization methods for the Supply Chain Management and for modern logistic approaches.

**Annotation**

The planned lectures in the next terms can be found on the websites of the respective institutes IISM, IFL and IOR.

**Workload**

The total workload of the module is about 240 hours. The workload is proportional to the credit points of the individual courses.
Module: Team Project Management and Technology [M-WIWI-105440]

**Responsible:** Prof. Dr. Martin Klarmann  
Prof. Dr. Alexander Mädche

**Organisation:** KIT Department of Economics and Management

**Part of:** Compulsory Elective Modules (Team Project)

<table>
<thead>
<tr>
<th>Credits</th>
<th>Grading scale</th>
<th>Recurrence</th>
<th>Duration</th>
<th>Language</th>
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<td>Grade to a tenth</td>
<td>Each term</td>
<td>1 term</td>
<td>German/English</td>
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</table>

**Mandatory**

| T-WIWI-110968 | Team Project Management and Technology | 9 CR | Klarmann, Mädche |

**Competence Certificate**

Alternative exam assessment. The basis for grading is the documents produced, the presentations during the course of the project, the artifact to be produced (e.g. algorithm, method, model, software, component) and the final presentation.

**Modeled Conditions**

The following conditions have to be fulfilled:

1. The module M-WIWI-105447 - Team Project Management and Technology (BUS/ENG) must not have been started.

**Competence Goal**

After successful completion of the team project, the students can:

- select and apply the methods, techniques and tools required for problem solving
- systematically analyze a given problem in an interdisciplinary team and develop and evaluate an artifact-centered solution
- constructively solve challenges and conflicts that arise in teamwork.

**Content**

The team project "Management and Technology" aims to prepare students for working in heterogeneously composed teams. A team of 4-5 students will work on defined interdisciplinary questions at the interface of economics and MINT subjects. The result of the projects should typically not only be a presentation or a report, but an artifact, e.g. a method, an algorithm, a model, a software or a component.

The team projects already implement the concept of research-oriented teaching in the Bachelor's degree and aim to build up problem-solving competence in the students.

**Workload**

The total of 270 working hours (9 credit points) per team member (4-5 members per team) are divided into the following tasks:

- communication:
  - Team meetings: 30 h (2h per week, 15 weeks),
  - Electronic exchange: 20 h,
  - Final presentation: 10

- Documentation and development:
  - Analysis and design: 70 h,
  - Development: 90 h,
  - Tests and quality assurance: 50 h
7.78 Module: Team Project Management and Technology (BUS/ENG) [M-WIWI-105447]

Organisation: KIT Department of Economics and Management
Part of: Compulsory Elective Modules (Business Administration oder Engineering Sciences)

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Mandatory

T-WIWI-110977 Team Project Management and Technology (BUS/ENG) 9 CR Klarmann, Mädche

Competence Certificate
Alternative exam assessment. The basis for grading is the documents produced, the presentations during the course of the project, the artifact to be produced (e.g. algorithm, method, model, software, component) and the final presentation.

Modeled Conditions
The following conditions have to be fulfilled:

1. The module M-WIWI-105440 - Team Project Management and Technology must not have been started.

Competence Goal
After successful completion of the team project, the students can:

- select and apply the methods, techniques and tools required for problem solving
- systematically analyze a given problem in an interdisciplinary team and develop and evaluate an artifact-centered solution
- constructively solve challenges and conflicts that arise in teamwork.

Content
The team project "Management and Technology" is carried out by a business administration or engineering institute. It aims to prepare students for working in heterogeneously composed teams. A team of 4-5 students will work on defined interdisciplinary questions at the interface of economics and MINT subjects. The result of the projects should typically not only be a presentation or a report, but an artifact, e.g. a method, an algorithm, a model, a software or a component. The team projects already implement the concept of research-oriented teaching in the Bachelor's degree and aim to build up problem-solving competence in the students.

Workload
The total of 270 working hours (9 credit points) per team member (4-5 members per team) are divided into the following tasks:

- communication:
  - Team meetings: 30 h (2h per week, 15 weeks),
  - Electronic exchange: 20 h,
  - Final presentation: 10
- Documentation and development:
  - Analysis and design: 70 h,
  - Development: 90 h,
  - Tests and quality assurance: 50 h
7.79 Module: Technical Logistics [M-MACH-101279]

**Responsible:** Prof. Dr.-Ing. Kai Furmans

**Organisation:** KIT Department of Mechanical Engineering

**Part of:**
- Engineering Sciences (Specialisation Program Engineering Sciences)
- Compulsory Elective Modules (Business Administration oder Engineering Sciences)
- Compulsory Elective Modules (Engineering Sciences)

**Credits** 9  
**Grading scale** Grade to a tenth  
**Recurrence** Each winter term  
**Duration** 1 term  
**Language** German  
**Level** 3  
**Version** 4

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<td>T-MACH-109920</td>
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</tbody>
</table>

**Competence Certificate**

The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the single courses of this module, whose sum of credits must meet the requirement of credits of this module. The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

T-MACH-109920 "Basics of Technical Logistics II" is based on T-MACH-109919 "Basics of Technical Logistics I". The contents are taught one after the other in one course in the winter semester. The individual exams are taken on one day at the end of the semester.

**Prerequisites**

none

**Competence Goal**

The student

- acquires well-founded knowledge on the main topics of technical logistics
- gets an overview of different applications of technical logistics in practice.
- acquires expertise and understanding about functionality of material handling systems.

**Content**

The module Technical Logistics provides in-depth basics on the main topics of technical logistics. The module focuses on technical characteristics of material handling technology. To gain a deeper understanding, the course is accompanied by exercises.

**Workload**

270 hours

**Learning type**

Lecture
Module: Topics in Finance I [M-WIWI-101465]

**Responsible:** Prof. Dr. Martin Ruckes
Prof. Dr. Marliese Uhrig-Homburg

**Organisation:** KIT Department of Economics and Management

**Part of:** Business Administration (Specialisation Program Business Administration)
Compulsory Elective Modules (Business Administration oder Engineering Sciences)
Compulsory Elective Modules (Business Administration)

<table>
<thead>
<tr>
<th>Credits</th>
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<th>Recurrence</th>
<th>Duration</th>
<th>Language</th>
<th>Level</th>
<th>Version</th>
</tr>
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<tbody>
<tr>
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<td>Each term</td>
<td>1 term</td>
<td>German/English</td>
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**Compulsory Elective Courses (Elective: 9 credits)**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Grading</th>
<th>Recurrence</th>
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<th>Level</th>
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<tr>
<td>T-WIWI-102643</td>
<td>Derivatives</td>
<td>4.5 CR</td>
<td>Uhrig-Homburg</td>
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<td>T-WIWI-110797</td>
<td>eFinance: Information Systems for Securities Trading</td>
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<td>Financial Intermediation</td>
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<td>T-WIWI-112694</td>
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<td>T-WIWI-102626</td>
<td>Business Strategies of Banks</td>
<td>3 CR</td>
<td>Müller</td>
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<td>T-WIWI-108711</td>
<td>Basics of German Company Tax Law and Tax Planning</td>
<td>4.5 CR</td>
<td>Gutekunst, Wigger</td>
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<tr>
<td>T-WIWI-102646</td>
<td>International Finance</td>
<td>3 CR</td>
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<tr>
<td>T-WIWI-110511</td>
<td>Strategic Finance and Technology Change</td>
<td>1.5 CR</td>
<td>Ruckes</td>
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</table>

**Competence Certificate**
The assessment is carried out as partial exams (according to Section 4(2) of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The examinations are offered every semester. Re-examinations are offered at every ordinary examination date. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

**Prerequisites**
It is only possible to choose this module in combination with the module Essentials in Finance. The module is passed only after the final partial exam of Essentials in Finance is additionally passed. In addition to that it is possible to choose the module Topics in Finance II.

**Competence Goal**
The student
- has advanced skills in modern finance
- is able to apply these skills in practice in the fields of finance and accounting, financial markets and banking

**Content**
The module Topics in Finance I is based on the module Essentials of Finance. The courses deal with advanced issues concerning the fields of finance and accounting, financial markets and banking from a theoretical and practical point of view.

**Annotation**
The course T-WIWI-102790 "Specific Aspects in Taxation" will no longer be offered in the module as of winter semester 2018/2019.

**Workload**
The total workload of the module is about 240 hours. The workload is proportional to the credit points of the individual courses.
7.81 Module: Topics in Finance II [M-WIWI-101423]

**Responsible:** Prof. Dr. Martin Ruckes  
Prof. Dr. Marliese Uhrig-Homburg

**Organisation:** KIT Department of Economics and Management

**Part of:**  
- Business Administration (Specialisation Program Business Administration)  
- Compulsory Elective Modules (Business Administration oder Engineering Sciences)  
- Compulsory Elective Modules (Business Administration)

<table>
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<th>Credits</th>
<th>Grading scale</th>
<th>Recurrence</th>
<th>Duration</th>
<th>Language</th>
<th>Level</th>
<th>Version</th>
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<td>Grade to a tenth</td>
<td>Each term</td>
<td>1 term</td>
<td>German/English</td>
<td>3</td>
<td>9</td>
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</table>

**Election notes**

This module will not count towards the degree until the module **Essentials in Finance** has also been successfully completed. The Essentials in Finance module may not be booked out as an additional examination.

**Compulsory Elective Courses (Election: 9 credits)**

<table>
<thead>
<tr>
<th>Course Code</th>
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<td>T-WIWI-110797</td>
<td>eFinance: Information Systems for Securities Trading</td>
<td>4.5 CR</td>
<td>Weinhardt</td>
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<td>T-WIWI-102623</td>
<td>Financial Intermediation</td>
<td>4.5 CR</td>
<td>Ruckes</td>
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<td>T-WIWI-107505</td>
<td>Financial Accounting for Global Firms</td>
<td>4.5 CR</td>
<td>Luedecke</td>
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<td>T-WIWI-112694</td>
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<td>4.5 CR</td>
<td>Thimme</td>
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<td>T-WIWI-102626</td>
<td>Business Strategies of Banks</td>
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<td>Basics of German Company Tax Law and Tax Planning</td>
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<tr>
<td>T-WIWI-110511</td>
<td>Strategic Finance and Technology Change</td>
<td>1.5 CR</td>
<td>Ruckes</td>
</tr>
</tbody>
</table>

**Competence Certificate**

The assessment is carried out as partial exams (according to Section 4(2) of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The examinations are offered every semester. Re-examinations are offered at every ordinary examination date. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

**Prerequisites**

It is only possible to choose this module in combination with the module **Essentials in Finance**. The module is passed only after the final partial exam of **Essentials in Finance** is additionally passed.

In addition to that it is possible to choose the module **Topics in Finance I**.

**Competence Goal**

The student

- has advanced skills in modern finance
- is able to apply these skills in practice in the fields of finance and accounting, financial markets and banking

**Content**

The module Topics in Finance II is based on the module Essentials of Finance. The courses deal with advanced issues concerning the fields of finance and accounting, financial markets and banking from a theoretical and practical point of view.

**Annotation**

The course T-WIWI-102790 "Special Taxation" will no longer be offered in the module as of winter semester 2018/1019.

**Workload**

The total workload for this module is approximately 270 hours.
7.82 Module: Vehicle Development [M-MACH-101265]

**Responsible:** Prof. Dr. Frank Gauterin

**Organisation:** KIT Department of Mechanical Engineering

**Part of:**
- Engineering Sciences (Specialisation Program Engineering Sciences)
- Compulsory Elective Modules (Business Administration oder Engineering Sciences)
- Compulsory Elective Modules (Engineering Sciences)

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<th>Grading scale</th>
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<th>Language</th>
<th>Level</th>
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**Vehicle Development (Election: at least 9 credits)**

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<th>Language</th>
<th>Level</th>
<th>Version</th>
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<tbody>
<tr>
<td>T-MACH-102207</td>
<td>Tires and Wheel Development for Passenger Cars</td>
<td>3 CR</td>
<td>Leister</td>
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<td>T-MACH-111389</td>
<td>Fundamentals in the Development of Commercial Vehicles</td>
<td>3 CR</td>
<td>Weber</td>
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<td>T-MACH-105162</td>
<td>Fundamentals of Automobile Development I</td>
<td>1.5 CR</td>
<td>Frech</td>
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<td>T-MACH-105163</td>
<td>Fundamentals of Automobile Development II</td>
<td>1.5 CR</td>
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<td>T-MACH-102156</td>
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<td>T-MACH-110796</td>
<td>Python Algorithm for Vehicle Technology</td>
<td>4 CR</td>
<td>Rhode</td>
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<td>T-MACH-105172</td>
<td>Simulation of Coupled Systems</td>
<td>4 CR</td>
<td>Geimer</td>
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<td>T-MACH-108888</td>
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<td>T-MACH-102148</td>
<td>Gear Cutting Technology</td>
<td>4 CR</td>
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<td>T-MACH-112126</td>
<td>Data-Driven Algorithms in Vehicle Technology</td>
<td>4 CR</td>
<td>Scheubner</td>
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</table>

**Competence Certificate**
The assessment is carried out as partial exams.

The partial exams consists of a written exam (90 to 120 minutes) or an oral exam (duration 30 to 40 minutes).

**Prerequisites**
None

**Competence Goal**
The student
- knows and understands the procedures in automobile development,
- knows and understands the technical specifications at the development procedures,
- is aware of notable boundaries like legislation.

**Content**
By taking the module Vehicle Development the students get to know the methods and processes applied in the automobile industry. They learn the technical particularities which have to be considered during the vehicle development and it is shown how the numerous single components cooperate in a harmoniously balanced complete vehicle. There is also paid attention on special boundary conditions like legal requirements.

**Workload**
The total work load for this module is about 270 Hours (9 Credits). The partition of the work load is carried out according to the credit points of the courses of the module. The work load for courses with 6 credit points is about 180 hours, for courses with 4.5 credit points about 135 hours, for courses with 3 credit points about 90 hours, and for courses with 1.5 credit points about 45 hours. The total number of hours per course results from the time of visiting the lectures and exercises, as well as from the exam duration and the time that is required to achieve the objectives of the module as an average student with an average performance.

**Recommendation**

**Learning type**
The teaching and learning procedures (lecture, lab course, workshop) are described for each course of the module separately.
8 Courses

8.1 Course: Advanced Lab Blockchain Hackathon (Bachelor) [T-WIWI-111127]

**Responsible:** Prof. Dr. Ali Sunyaev

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-101426 - Electives in Informatics

<table>
<thead>
<tr>
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<th>Recurrence</th>
<th>Version</th>
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**Events**

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<th>Code</th>
<th>Title</th>
<th>Type/On-Site/Online</th>
<th>Responsible</th>
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</thead>
<tbody>
<tr>
<td>WT 23/24</td>
<td>2512402</td>
<td>Advanced Lab Blockchain Hackathon (Bachelor)</td>
<td>Practical course/🖥</td>
<td>Sunyaev, Kannengießer, Sturm, Beyene</td>
</tr>
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</table>

**Exams**

<table>
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<tr>
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<th>Code</th>
<th>Title</th>
<th>Responsible</th>
</tr>
</thead>
<tbody>
<tr>
<td>ST 2023</td>
<td>7900096</td>
<td>Advanced Lab Blockchain Hackathon (Bachelor)</td>
<td>Sunyaev</td>
</tr>
</tbody>
</table>

**Legend:** 🖥 Online, 🧩 Blended (On-Site/Online), 🔴 On-Site, ✗ Canceled

**Competence Certificate**

The alternative exam assessment consists of:

- a practical work
- a presentation and
- a written seminar thesis

Practical work, presentation and written thesis are weighted according to the course.

**Prerequisites**

None
8 COURSES

Course: Advanced Lab Informatics (Bachelor) [T-WIWI-110541]

8.2 Course: Advanced Lab Informatics (Bachelor) [T-WIWI-110541]

Responsible: Professorenschaft des Instituts AIFB
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101426 - Electives in Informatics

<table>
<thead>
<tr>
<th>Events</th>
<th>Type</th>
<th>Credits</th>
<th>Grading scale</th>
<th>Recurrence</th>
<th>Version</th>
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<tr>
<td>ST 2023 2512204</td>
<td>Lab Realisation of innovative services (Bachelor)</td>
<td>3 SWS</td>
<td>Practical course / Blended</td>
<td>Schiefer, Schüler, Toussaint</td>
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<tr>
<td>ST 2023 2512400</td>
<td>Advanced Lab Development of Sociotechnical Information Systems (Bachelor)</td>
<td>3 SWS</td>
<td>Practical course / Blended</td>
<td>Sunyaev, Pandl, Goram, Leiser</td>
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<tr>
<td>ST 2023 2512402</td>
<td>Advanced Lab Blockchain Hackathon (Bachelor)</td>
<td>Practical course / Blended</td>
<td>Sunyaev, Sturm, Kannengießer, Beyene</td>
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<tr>
<td>ST 2023 2512204</td>
<td>Lab Realisation of innovative services (Bachelor)</td>
<td>3 SWS</td>
<td>Practical course / Blended</td>
<td>Oberweis, Toussaint, Schiefer, Schüler</td>
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<tr>
<td>ST 2023 2512400</td>
<td>Practical Course Sociotechnical Information Systems Development (Bachelor)</td>
<td>3 SWS</td>
<td>Practical course / Blended</td>
<td>Sunyaev, Goram, Leiser</td>
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<td>ST 2023 2512402</td>
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<td>Practical course / Blended</td>
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<tr>
<td>ST 2023 2512554</td>
<td>Praktikum Security, Usability and Society (Bachelor)</td>
<td>3 SWS</td>
<td>Practical course / Blended</td>
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<table>
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<td>Sunyaev</td>
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</tbody>
</table>

Legend: Online, Blended (On-Site/Online), On-Site, C Cancelled

Competence Certificate
The alternative exam assessment consists of:

- a practical work
- a presentation and
- a written seminar thesis

Practical work, presentation and written thesis are weighted according to the course.

Prerequisites
None

Annotation
The title of this course is a generic one. Specific titles and the topics of offered seminars will be announced before the start of a semester in the internet at https://portal.wiwi.kit.edu.

Below you will find excerpts from events related to this course:
<table>
<thead>
<tr>
<th>Course Title</th>
<th>ID</th>
<th>Semester</th>
<th>Credits</th>
<th>Language</th>
<th>Access</th>
<th>Delivery</th>
<th>Content</th>
<th>Organizational Issues</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Lab Realisation of innovative services (Bachelor)</strong></td>
<td>2512204</td>
<td>SS 2023</td>
<td>3 SWS</td>
<td>German, Open in study portal</td>
<td>Practical course (P) Blended (On-Site/Online)</td>
<td></td>
<td>As part of the lab, the participants should work together in small groups to realize innovative services (mainly for students). Further information can be found on the ILLIAS page of the lab.</td>
<td>Die genauen Termine und Informationen zur Anmeldung werden auf der Veranstaltungsseite bekannt gegeben.</td>
</tr>
<tr>
<td><strong>Advanced Lab Development of Sociotechnical Information Systems (Bachelor)</strong></td>
<td>2512400</td>
<td>SS 2023</td>
<td>3 SWS</td>
<td>German/English, Open in study portal</td>
<td>Practical course (P) Online</td>
<td></td>
<td>The aim of the lab is to get to know the development of socio-technical information systems in different application areas. In the event framework, you should develop a suitable solution strategy for your problem alone or in group work, collect requirements, and implement a software artifact based on it (for example, web platform, mobile apps, desktop application). Another focus of the lab is on the subsequent quality assurance and documentation of the implemented software artifact. Registration information will be announced on the course page.</td>
<td></td>
</tr>
<tr>
<td><strong>Lab Realisation of innovative services (Bachelor)</strong></td>
<td>2512204</td>
<td>WS 23/24</td>
<td>3 SWS</td>
<td>German, Open in study portal</td>
<td>Practical course (P) Blended (On-Site/Online)</td>
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<tr>
<td><strong>Praktikum Security, Usability and Society (Bachelor)</strong></td>
<td>2512554</td>
<td>WS 23/24</td>
<td>3 SWS</td>
<td>German/English, Open in study portal</td>
<td>Practical course (P) Online</td>
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</tbody>
</table>
**Content**

The Praktikum "Security, Usability and Society" will cover topics both of usable security and privacy programming, and how to conduct user studies. To reserve a place, please, register on the WiWi portal and send an email with your chosen topic, plus a back-up one, to mattia.mossano@kit.edu. Topics are assigned first-come-first-served until all of them are filled. The deadline for the first round is 18.07.2022. Topics in italics have been already assigned.

**Important dates:**

- **Kick-off:** 13.10.2022, 10:00 AM CET in Big Blue Button - [Link](#)
- **Report + code submission:** 30.01.2023 23:59 CET
- **Presentation deadline:** 30.01.2023, 23:59 CET
- **Presentation day:** 01.02.2023

**Topics:**

### Programming Usable Security Intervention

In this subject, students develop a part of coding, an extension, or another programming task dealing with various usable security interventions, eg as an extension. Eg TORPEDO ([https://secuso.aifb.kit.edu/english/TORPEDO.php](https://secuso.aifb.kit.edu/english/TORPEDO.php)) or PassSec + ([https://secuso.aifb.kit.edu/english/PassSecPlus.php](https://secuso.aifb.kit.edu/english/PassSecPlus.php)). Just as before, students are provided with a point list of goals, containing both basic features mandatory to pass the course and more advanced ones that heighten the final grade.

**Title:** Portfolio Graphical Recognition-Based PWDs with Gamepads  
**Number of students:** 2 Bachelor or Master level  
**Description:** Graphical passwords use graphical elements as passwords and they are usually easier to remember than textual passwords. Moreover, they can be combined with "portfolio authentication" techniques to make them shoulder surfing resistant. The goal of this topic is to implement a graphical portfolio authentication scheme for gamepads, based on previous textual schemes implementations.

**Title:** Development of a secure web interface with a ticket system for the Hashcat Password Cracker  
**Number of students:** 2 Bachelor or Master level  
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### Designing Security User studies

These topics are related to how to set up and conducting user studies of various types. This year, due to the Corona outbreak, we decided to conduct online studies only; otherwise, interviews and in lab studies would have been possible. At the end of the semester, the students present a report / paper and a talk in which they present their results.

**Title:** NoPhish Cardgame  
**Number of students:** 1/2 Bachelor level  
**Description:** Das NoPhish Konzept findet bereits in vielen Formen Anwendung. Es hilft dabei betrügerische Nachrichten von legitiem zu Unterscheiden. Die neueste Form ist ein Cardgame bei dem man spielerisch lernen kann Phishing zu erkennen. Hierbei wird sowohl grundlegendes Wissen, als auch konkretes Wissen vermittelt. Aufgabe: Erheben von Daten (Studienidesign ist bereits vorhanden) und Auswertung bestehender Daten mit neu erhobenen Daten

**Title:** Analysing the perfections on email subject extensions like 'Caution - This e-mail is sent from someone outside the company'  
**Number of students:** 1/2 Bachelor or Master level  
**Description:** Email subject extensions are used in myn organisations to reduce the risk to become a victim of a phishing email - why should your boss e.g. send you an external email? Likely to be a phish! The idea is to develop the study protocol and to collect first data which should be analysed.

**Title:** Benutzerstudie zur Erkennung von Angriffen auf die E-Mail Absicherung mit S/MIME-Zertifikaten  
**Number of students:** 2 Bachelor or Master level  

**Title:** Evaluation of the Sudoku Privacy Friendly App usability for users with rheumatoid arthritis (English only)  
**Number of students:** 1 Bachelor or Master level  
**Description:** The Privacy Friendly Apps are a set of applications developed by the SECUSO group that do not contain any advertisement or tracking mechanism, hence preserving the privacy of their users ([https://secuso.aifb.kit.edu/english/105.php](https://secuso.aifb.kit.edu/english/105.php)). One of these apps is "Sudoku", available for Android on both the Google Store and F-Droid. Although the app is friendly to privacy that other alternatives, it requires multiple tactile interactions with the mobile device. This can be an issue for users with reduced hand mobility, such as those suffering from rheumatoid arthritis. To approximate the reduced mobility caused by reumatoid arthritis in healthy users, it is common to use arthritis simulation gloves (e.g., [https://idarinstitute.com/products/arthritis-simulation-gloves](https://idarinstitute.com/products/arthritis-simulation-gloves)). The task of the student is to design a lab study involving arthritis simulation gloves that evaluates the Sudoku app usability for users suffering from rheumatoid arthritis.
Title: Replication and extension of "What is this URL's destination?" (English only)
Number of students: 1 Bachelor level
Description: Replication of studies is a fundamental part of the scientific process: it allows to confirm or deny experimental results and can open new lines of research. This topic is a replication of the study presented in Albakry, S., Vaniea, K. & Wolters, M.K. (2020) What is this URL's destination? Empirical Evaluation of Users' URL Reading" (https://doi.org/10.1145/3313831.3376168). The student will re-implement the study following the precise description from the original authors, run it and then compare the results with the previous iteration.

Title: Password Generator Defaults
Number of students: 2 Bachelor or Master level
Description: Password Managers are useful tools that help the use of complex passwords and avoid the password recycle practice. Moreover, they support users by providing password generator tools, that create random password of specific length. However, the defaults settings might be at odds with the password policies of popular website, e.g., they can contain forbidden characters or be too long/short. Moreover, we need to understand if Password Managers users change the default settings to generate passwords, in how many cases and for what reasons. The students task is therefore two-folds: (1) compare the default settings of several Password Managers to the privacy policies of popular websites; (2) design and implement a survey to collect the behavior of Password Managers users with regard to the password generator tools.

Title: Benutzerstudie zur Auswertung der PassSec+ Browser Extension mittels Eye-Tracking
Number of students: 1/2 Bachelor or Master level

This event counts towards the KASTEL certificate. Further information on how to obtain the certificate can be found on the SECUSO website https://secuso.aifb.kit.edu/Studium_und_Lehre.php.

Praktikum Security, Usability and Society (Master)
2512555, WS 23/24, 3 SWS, Language: German/English, Open in study portal
Content
The Praktikum "Security, Usability and Society" will cover topics both of usable security and privacy programming, and how to conduct user studies. To reserve a place, please, register on the WiWi portal and send an email with your chosen topic, plus a back-up one, to mattia.mossano@kit.edu. Topics are assigned first-come-first-served until all of them are filled. The deadline for the first round is 18.07.2022. Topics in italics have been already assigned.

WiWi portal: https://portal.wiwi.kit.edu/ys/6273

Important dates:
Kick-off: 13.10.2022, 10:00 AM CET in Big Blue Button - Link
Report + code submission: 30.01.2023 23:59 CET
Presentation deadline: 30.01.2023, 23:59 CET
Presentation day: 01.02.2023

Topics:
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In this subject, students develop a part of coding, an extension, or another programming task dealing with various usable security interventions, eg as an extension. Eg TORPEDO (https://secuso.alfb.kit.edu/english/TORPEDO.php) or PassSec + (https://secuso.alfb.kit.edu/english/PASSSecPlus.php). Just as before, students are provided with a point list of goals, containing both basic features mandatory to pass the course and more advanced ones that heighten the final grade.

Title: Portfolio Graphical Recognition-Based PWDs with Gamepads
Number of students: 2 Bachelor or Master level
Description: Graphical passwords use graphical elements as passwords and they are usually easier to remember than textual passwords. Moreover, they can be combined with "portfolio authentication" techniques to make them shoulder surfing resistant. The goal of this topic is to implement a graphical portfolio authentication scheme for gamepads, based on previous textual schemes implementations.

Title: Development of a secure web interface with a ticket system for the Hashcat Password Cracker
Number of students: 2 Bachelor or Master level
Description: Hashcat is a console application which allows to crack passwords using a given wordlist or password pattern. In order to allow multiple not necessarily trustworthy users to register a password cracking job with the specified parameters in parallel, a web platform with a ticket system should be developed within the framework of this laboratory topic. Therefore a frontend and backend should be implemented separately and a clear description of the interface between is essential part of this work. Python with Flask Web Framework can be used to implement the backend. Good knowledge in programming, APIs and web security are required.

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Title: Analysing the perceptions on email subject extensions like ‘Caution’ - This e-mail is sent from someone outside the company' 
Number of students: 1/2 Bachelor or Master level
Description: Email subject extensions are used in mail organizations to reduce the risk to become a victim of a phishing email - why should your boss e.g. send you an external email? Likely to be a phish! The idea is to develop the study protocol and to collect first data which should be analysed.

Title: Benutzerstudie zur Erkennung von Angriffen auf die E-Mail Absicherung mit S/MIME-Zertifikaten
Number of students: 2 Bachelor or Master level

Title: Evaluation of the Sudoku Privacy Friendly App usability for users with rheumatoid arthritis (English only)
Number of students: 1 Bachelor or Master level
Description: The Privacy Friendly Apps are a set of applications developed by the SECUSO group that do not contain any advertisement or tracking mechanism, hence preserving the privacy of their users (https://secuso.alfb.kit.edu/english/105.php). One of these apps is “Sudoku”, available for Android on both the Google Store and F-Droid. Although the app is friendlier to privacy that other alternatives, it requires multiple tactile interactions with the mobile device. This can be an issue for users with reduced hand mobility, such as those suffering from rheumatoid arthritis. To approximate the reduced mobility caused by reumatoid arthritis in healthy users, it is common to use arthritis simulation gloves (e.g. https://idarinistitute.com/products/arthritis-simulation-gloves). The task of the student is to design a lab study involving arthritis simulation gloves that evaluates the Sudoku app usability for users suffering from rheumatoid arthritis.
Title: Password Generator Defaults
Number of students: 2 Bachelor or Master level
Description: Password Managers are useful tools that help the use of complex passwords and avoid the password recycle practice. Moreover, they support users by providing password generator tools, that create random password of specific length. However, the defaults settings might be at odds with the password policies of popular website, e.g., they can contain forbidden characters or be too long/short. Moreover, we need to understand if Password Managers users change the default settings to generate passwords, in how many cases and for what reasons. The students task is therefore two-folds: (1) compare the default settings of several Password Managers to the privacy policies of popular websites; (2) design and implement a survey to collect the behavior of Password Managers users with regard to the password generator tools.

Title: Benutzerstudie zur Auswertung der PassSec+ Browser Extension mittels Eye-Tracking
Number of students: 1/2 Bachelor or Master level

Title: User study on user's knowledge about brainwaves verification
Number of students: 1 Master level
Description: Brainwaves can be used to authenticate users. However, several questions are left unanswered regarding the users' stance on this: What is the prior knowledge of users about verification and brainwaves? Are they comfortable wearing a device to record their brainwaves? How are they feeling regarding storing their brainwaves samples? Which kind of information can be extracted from the smaples? How secure would such an authentication scheme be? The task of the student is to design, implement an pre-test a user study investigating these questions.

This event counts towards the KASTEL certificate. Further information on how to obtain the certificate can be found on the SECUSO website [https://secuso.aifb.kit.edu/Studium_und_Lehre.php](https://secuso.aifb.kit.edu/Studium_und_Lehre.php).
8 COURSES

Course: Advanced Lab Realization of Innovative Services (Bachelor) [T-WIWI-112915]

8.3 Course: Advanced Lab Realization of Innovative Services (Bachelor) [T-WIWI-112915]

**Responsible:** Prof. Dr. Andreas Oberweis

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-101426 - Electives in Informatics

### Events

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**Exams**

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**Legend:** 🖥 Online, 🧩 Blended (On-Site/Online), 🔴 On-Site, ⤓ CANCELLED

**Competence Certificate**

The alternative exam assessment consists of:

- a practical work
- a presentation and
- a written seminar thesis

Practical work, presentation and written thesis are weighted according to the course.

**Annotation**

As part of the lab, the participants should work together in small groups to produce innovative services (mainly for students).

Further information can be found on the ILIAS page of the lab.

*Below you will find excerpts from events related to this course:*

**Lab Realisation of innovative services (Bachelor)**

2512204, SS 2023, 3 SWS, Language: German, [Open in study portal](#)

**Practical course (P)**

Blended (On-Site/Online)

**Content**

As part of the lab, the participants should work together in small groups to realize innovative services (mainly for students).

Further information can be found on the ILIAS page of the lab.

**Organizational issues**

Die genauen Termine und Informationen zur Anmeldung werden auf der Veranstaltungsseite bekannt gegeben.
### 8.4 Course: Advanced Lab Security, Usability and Society [T-WIWI-108439]

**Responsible:** Prof. Dr. Melanie Volkamer  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101426 - Electives in Informatics

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<td>Practical course / 🖥</td>
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<td>WT 23/24</td>
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</table>

Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗬️ On-Site, ✗ Cancelled  

#### Competence Certificate
The alternative exam assessment consists of:
- a practical work  
- a presentation and possibly  
- a written seminar thesis

Practical work, presentation and written thesis are weighted according to the course.

#### Prerequisites
None

#### Recommendation
Knowledge from the lecture "Information Security" is recommended.

#### Annotation
The course will not be offered in the summer semester 2023.

Below you will find excerpts from events related to this course:
Content
The Praktikum "Security, Usability and Society" will cover topics both of usable security and privacy programming, and how to conduct user studies. To reserve a place, please, register on the WiWi portal and send an email with your chosen topic, plus a backup option, to mattia.mossano@kit.edu. Topics are assigned first-come-first-served until all of them are filled. The deadline for the first round is 18.07.2022. Topics in italics have been already assigned.

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Topics:

Programming Usable Security Intervention
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Title: Portfolio Graphical Recognition-Based PWDs with Gamepads
Number of students: 2 Bachelor or Master level
Description: Graphical passwords use graphical elements as passwords and they are usually easier to remember than textual passwords. Moreover, they can be combined with “portfolio authentication” techniques to make them shoulder surfing resistant. The goal of this topic is to implement a graphical portfolio authentication scheme for gamepads, based on previous textual schemes implementations.

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Number of students: 2 Bachelor or Master level
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Title: Analysing the perceptions on email subject extensions like ‘Caution’ - This e-mail is sent from someone outside the company
Number of students: 1/2 Bachelor or Master level
Description: Email subject extensions are used in many organizations to reduce the risk to become a victim of a phishing email - why should your boss e.g. send you an external email? Likely to be a phish! The idea is to develop the study protocol and to collect first data which should be analysed.

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Number of students: 2 Bachelor or Master level

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Title: Password Generator Defaults
Number of students: 2 Bachelor or Master level
Description: Password Managers are useful tools that help the use of complex passwords and avoid the password recycle practice. Moreover, they support users by providing password generator tools, that create random password of specific length. However, the defaults settings might be at odds with the password policies of popular website, e.g., they can contain forbidden characters or be too long/short. Moreover, we need to understand if Password Managers users change the default settings to generate passwords, in how many cases and for what reasons. The students task is therefore two-folds: (1) compare the default settings of several Password Managers to the privacy policies of popular websites; (2) design and implement a survey to collect the behavior of Password Managers users with regard to the password generator tools.

Title: Benutzerstudie zur Auswertung der PassSec+ Browser Extension mittels Eye-Tracking
Number of students: 1/2 Bachelor or Master level

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Title: Analysing the perceptions on email subject extensions like 'Caution - This e-mail is sent from someone outside the company'
Number of students: 1/2 Bachelor or Master level
Description: Email subject extensions are in many organizations to reduce the risk to become a victim of a phishing email - why should your boss e.g. send you an external email? Likely to be a phish! The idea is to develop the study protocol and to collect first data which should be analysed.

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Number of students: 2 Bachelor or Master level

Title: Evaluation of the Sudoku Privacy Friendly App usability for users with rheumatoid arthritis (English only)
Number of students: 1 Bachelor or Master level
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Number of students: 1/2 Bachelor or Master level

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Number of students: 1 Master level
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This event counts towards the KASTEL certificate. Further information on how to obtain the certificate can be found on the SECUSO website https://secuso.aifb.kit.edu/Studium_und_Lehre.php.
### 8.5 Course: Advanced Lab Sociotechnical Information Systems Development (Bachelor) [T-WIWI-111124]

**Responsible:** Prof. Dr. Ali Sunyaev  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101426 - Electives in Informatics

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<tr>
<td>WT 23/24</td>
<td>2512400</td>
<td>Practical Course Sociotechnical Information Systems Development (Bachelor)</td>
<td>3 SWS</td>
<td>Practical course / 🖥</td>
<td>Sunyaev, Goram, Leiser</td>
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**Exams**

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<tr>
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<th>Code</th>
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<tr>
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<td>Advanced Lab Development of Sociotechnical Information Systems (Bachelor)</td>
<td>Sunyaev</td>
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</table>

**Competence Certificate**

The alternative exam assessment consists of:

- a practical work
- a presentation and
- a written seminar thesis

Practical work, presentation and written thesis are weighted according to the course.

**Prerequisites**

None
8.6 Course: Advanced Programming - Application of Business Software [T-WIWI-102748]

**Responsibility:** Prof. Dr. Stefan Klink  
Prof. Dr. Andreas Oberweis

**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-105112 - Applied Informatics

<table>
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**Events**

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<td>2511026</td>
<td>Advanced Programming - Application of Business Software</td>
<td>2 SWS</td>
<td>Lecture / 🖥</td>
<td>Klink</td>
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<td>WT 23/24</td>
<td>2511027</td>
<td>Exercises Advanced Programming - Application of Business Software</td>
<td>1 SWS</td>
<td>Practice / 🗣</td>
<td>Klink, Schreiber</td>
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**Exams**

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<td>Advanced Programming - Application of Business Software</td>
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Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✗ Canceled

**Competence Certificate**

The success control takes place in the form of a written examination. The duration of the exam is 60 minutes in the winter semester 2020/21 and in the summer semester 2021. The examination is offered every semester and can be repeated at any regular examination date.

The prerequisite for taking the exam is successful participation in a computer lab. Attendance is compulsory for individual dates of the lab. More detailed information on participation in the exercises and labs will be announced in the first lecture hour and on the lecture homepage.

Admission can only be acquired in the winter semester and is valid indefinitely.

**Prerequisites**

This course cannot be taken together with Advanced Programming - Java Network Programming.

**Recommendation**

Knowledge of the course "Grundlagen der Informatik I und II" are helpful.

Below you will find excerpts from events related to this course:
Content
Business information systems enable, support, and accelerate new forms of business processes and forms of organisation. They are the central infrastructure of the economy in the age of eBusiness. Thus, basic knowledge is given in lectures, in exercises and in the computer lab which deals with installation, configuration and parameterization of business information systems. The course communicates profound knowledge in following topics:

- Analysis of cooperation scenarios and business process scenarios
- Selection of modelling methods according to defined criteria
- Implementation of business process models and cooperation models with the help of standard software
- Identification and assessment of challenges during the installation of information systems
- Economical evaluation of business information systems.

This course cannot be taken together with Advanced Programming - Java Network Programming [2511020].

Learning objectives:
Students

- explain basic concepts and principles of enterprise information systems,
- describe the components of enterprise information systems,
- assess economical aspects of such systems,
- use standard software for modelling business processes and for analysing them to given criteria.

Recommendations:
Knowledge of the course “Grundlagen der Informatik I und II” are helpful.

Workload:

- Lecture 30h
- Exercise course 17h
- Review and preparation of lectures 23h
- Review and preparation of exercises 10h
- Computer Lab 30h
- Exam preparation 26h
- Exam 1h
- Total 150h
- Exercise courses are done by student tutors (size about 50 students)

Literature


Weitere Literatur wird in der Vorlesung bekannt gegeben.
8.7 Course: Advanced Programming - Java Network Programming [T-WIWI-102747]

**Responsible:** Prof. Dr. Dietmar Ratz  
Prof. Dr.-Ing. Johann Marius Zöllner

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-105112 - Applied Informatics

**Type**  
Written examination

**Credits**  
4.5

**Grading scale**  
Grade to a third

**Recurrence**  
Each summer term

**Version**  
4

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<td>WT 23/24 7900020</td>
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**Competence Certificate**  
At the end of the lecture period, a written examination (90 min.) (according to§4(2), 1 SPO) will be held for which admission must be granted during the semester after successful participation in the practices. The exact details will be announced in the lecture. The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

**Prerequisites**  
This course cannot be taken together with Advanced Programming - Application of Business Software [2511026].

**Annotation**  
The registration for the participation in the computer lab (precondition for the exam participation) already takes place in the first lecture week!

Below you will find excerpts from events related to this course:

**Advanced Programming - Java Network Programming**  
2511020, SS 2023, 2 SWS, Language: German, Open in study portal
Content
In the lecture, the exercises and computer labs to this course the practical handling with the programming language Java dominating within the range of economical applications is obtained. The basis for this is the current language standard. The knowledge from the lecture Introduction to Programming with Java will be deepened and extended. This is done, among other things, by addressing commercially relevant topics such as object-oriented modeling and programming, class hierarchy and inheritance, threads, applications and applets, AWT and Swing components for graphical user interfaces, exception and event processing, lambda expressions, input/output via streams, applications in networks, Internet communication, client and server programming, remote method invocation, servlets, Java Server Pages and Enterprise Java Beans.

This course cannot be taken together with Advanced Programming - Application of Business Software [2540886/2590886].

Learning objectives:

- Students learn the practical use of the object-oriented programming language Java and are enabled to design and implement component-based Internet applications using the latest technologies and tools.
- The ability to select and design these methods and systems appropriate to the situation and to use them for solving problems is imparted.
- Students are empowered to find strategic and creative answers in the search for solutions to well-defined, concrete and abstract problems.

Workload:
The total workload for this course is approximately 150 hours.

Organizational issues
Die Anmeldung zur Teilnahme am Rechnerpraktikum (Vorbedingung zur Klausurteilnahme) findet bereits in der ersten Vorlesungswoche statt!

Literature

Weiterführende Literatur:

- Weitere Literatur wird in der Vorlesung bekannt gegeben.
**8 COURSES**

Course: Advanced Topics in Economic Theory [T-WIWI-102609]

### 8.8 Course: Advanced Topics in Economic Theory [T-WIWI-102609]

**Responsible:** Prof. Dr. Kay Mitusch  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101501 - Economic Theory

<table>
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**Competence Certificate**
The assessment consists of a written exam (60min) (following §4(2), 1 of the examination regulation) at the end of the lecture period or at the beginning of the following semester.

**Prerequisites**
None

**Recommendation**
This course is designed for advanced Master students with a strong interest in economic theory and mathematical models. Bachelor students who would like to participate are free to do so, but should be aware that the level is much more advanced than in other courses of their curriculum.
8.9 Course: Analysis of Social Structures (WiWi) [T-GEISTSOZ-109047]

**Responsible:** Prof. Dr. Gerd Nollmann

**Organisation:** KIT Department of Humanities and Social Sciences

**Part of:** M-GEISTSOZ-101167 - Sociology/Empirical Social Research

<table>
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<th>Recurrence</th>
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**Exams**

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<td>7400029</td>
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<td>Nollmann</td>
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Legend: 🖥 Online, 🌍 Blended (On-Site/Online), 🗦 On-Site, ✗ Cancelled
### Course: Analysis of Exhaust Gas and Lubricating Oil in Combustion Engines [T-MACH-105173]

**Responsible:** Dr.-Ing. Marcus Gohl  
**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101303 - Combustion Engines II

<table>
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#### Events

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<td>Gas, lubricating oil and operating media analysis in drive train development</td>
<td>Lecture / Gohl</td>
<td>2 SWS</td>
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#### Exams

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<td>76--T-Mach-105173</td>
<td>Analysis of Exhaust Gas and Lubricating Oil in Combustion Engines</td>
<td>Gohl</td>
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</table>

**Competence Certificate**

Letter of attendance or oral exam (25 minutes, no auxiliary means)

**Prerequisites**

none

Below you will find excerpts from events related to this course:

**Gas, lubricating oil and operating media analysis in drive train development**

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<tr>
<th>Event</th>
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<td>2134150</td>
<td>Gas, lubricating oil and operating media analysis in drive train development</td>
<td>Lecture (V) On-Site</td>
<td>2 SWS</td>
<td>Gohl</td>
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</table>

**Literature**

Die Vorlesungsunterlagen werden vor jeder Veranstaltung an die Studenten verteilt.
8.11 Course: Analysis of Multivariate Data [T-WIWI-103063]

Responsible: Prof. Dr. Oliver Grothe
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101599 - Statistics and Econometrics
M-WIWI-105414 - Statistics and Econometrics II

Competence Certificate
The assessment of this course is a written examination (60 min) according to §4(2), 1 of the examination regulation. The exam is offered every semester. Re-examinations are offered only for repeaters.

Prerequisites
None

Recommendation
Attendance of the courses Statistics 1 [2600008] and Statistics 2 [2610020] is recommended.

Annotation
The lecture is not offered regularly. The courses planned for three years in advance can be found online.
Course: Analysis Tools for Combustion Diagnostics [T-MACH-105167]

**Responsible:** Jürgen Pfeil

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101303 - Combustion Engines II

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**Type:** Oral examination  
**Credits:** 4  
**Grading scale:** Grade to a third  
**Recurrence:** Each summer term  
**Version:** 1

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<td>2 SWS</td>
<td>Analysis tools for combustion diagnostics</td>
<td>Each summer term</td>
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<td>Lecture / Pfeil</td>
<td>Each summer term</td>
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**Competence Certificate**  
oral examination, Duration: 25 min., no auxiliary means

**Prerequisites**  
none

**Below you will find excerpts from events related to this course:**

- **Analysis tools for combustion diagnostics**  
  2134134, SS 2023, 2 SWS, Language: German, Open in study portal

**Literature**  
Skrift, erhältlich in der Vorlesung
### 8.13 Course: Analytical CRM [T-WIWI-102596]

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<td>Grade to a third</td>
<td>Each summer term</td>
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**Responsible:** Prof. Dr. Andreas Geyer-Schulz  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101422 - Specialization in Customer Relationship Management

**Competence Certificate**  
The exam will be offered for first time writers for the last time in the summer semester 2020.

*Written examination (60 minutes) according to §4(2), 1 SPO.* The exam is considered passed if at least 50 out of a maximum of 100 possible points are achieved. The grades are graded in five steps (best grade 1.0 from 95 points). Details of the grade formation and scale will be announced in the course.

A bonus can be acquired through successful participation in the practice. If the grade of the written examination is between 4.0 and 1.3, the bonus improves the grade by one grade level (0.3 or 0.4). The exact criteria for awarding a bonus will be announced at the beginning of the course.

**Prerequisites**  
None

**Recommendation**  
We expect knowledge about data models and the UML modelling language concerning information systems.
**8.14 Course: Applied Informatics – Applications of Artificial Intelligence [T-WIWI-110340]**

**Responsible:** Dr.-Ing. Michael Färber

**Organisation:** KIT Department of Economics and Management

**Part of:**
- M-WIWI-101426 - Electives in Informatics
- M-WIWI-105112 - Applied Informatics

<table>
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<td>Lecture / 🕵️</td>
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<td>Färber, Käfer</td>
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<td>WT 23/24</td>
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<td>Exercises to Applied Informatics - Applications of Artificial Intelligence</td>
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<td>Practice / 🗣️</td>
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<td>Färber, Käfer, Qu, Yuan</td>
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**Exams**

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<td>Applied Informatics - Applications of AI (Registration until 17 July 2023)</td>
<td>Färber</td>
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<td>WT 23/24</td>
<td>79AIFB_AKI_C1</td>
<td>Applied Informatics – Applications of Artificial Intelligence</td>
<td>Färber</td>
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**Competence Certificate**

Written Examination (60 min) according to §4, Abs. 1 of the examination regulations or oral examination of 20 minutes according to §4, Abs. 2, 2 of the examination regulations. The exam takes place every semester and can be repeated at every regular examination date.

**Prerequisites**

None.

**Recommendation**

Basics in logic, e.g. from lecture Foundations of Informatics 1 are important.

Below you will find excerpts from events related to this course:

**V**

**Applied Informatics - Applications of Artificial Intelligence**

2511314, WS 23/24, 2 SWS, Language: German, [Open in study portal](#)

Lecture (V) Blended (On-Site/Online)
Content
The lecture provides insights into the fundamentals of artificial intelligence. Basic methods of artificial intelligence and their applications in industry are presented.

Applications of the AI is a sub-area of computer science dealing with the automation of intelligent behavior. In general, it is a question of mapping human intelligence. Methods of artificial intelligence are presented in various areas such as, for example, question answering systems, speech recognition and image recognition.

The lecture gives an introduction to the basic concepts of artificial intelligence. Essential theoretical foundations, methods and their applications are presented and explained.

This lecture aims to provide students with a basic knowledge and understanding of the structure, analysis and application of selected methods and technologies on artificial intelligence. The topics include, among others, knowledge modeling, machine learning, text mining, uninformed search, and intelligent agents.

Learning objectives:

The students

- consider current research topics in the field of artificial intelligence and in particular learn about the topics of knowledge modeling, machine learning, text mining and uninformed search.
- interdisciplinary thinking.
- technological approaches to current problems.

Workload:

- The total workload for this course is approximately 135 hours
- Time of presentness: 45 hours
- Time of preparation and postprocessing: 60 hours
- Exam and exam preparation: 30 hours

Exercises to Applied Informatics - Applications of Artificial Intelligence
2511315, WS 23/24, 1 SWS, Language: German, Open in study portal

Content
The exercises are oriented on the lecture applications of AI.

Multiple exercises are held that capture the topics, held in the lecture Applications of AI and discuss them in detail. Thereby, practical examples are given to the students in order to transfer theoretical aspects into practical implementation.

This lecture aims to provide students with a basic knowledge and understanding of the structure, analysis and application of selected methods and technologies on artificial intelligence. The topics include, among others, knowledge modeling, machine learning, text mining, uninformed search, and intelligent agents.

Learning objectives:

The students

- consider current research topics in the field of artificial intelligence and in particular learn about the topics of knowledge modeling, machine learning, text mining and uninformed search.
- interdisciplinary thinking.
- technological approaches to current problems.
**Course: Applied Informatics – Database Systems [T-WIWI-110341]**

**Responsible:** Prof. Dr. Andreas Oberweis  
**Organisation:** KIT Department of Economics and Management  
**Part of:**  
- M-WIWI-101426 - Electives in Informatics  
- M-WIWI-105112 - Applied Informatics  

<table>
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<th>Recurrence</th>
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<td>Practice / On-Site</td>
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| Exams | | |
| ST 2023 7900315 | Applied Informatics - Database Systems | Oberweis |
| ST 2023 79AIFB_DBS_B1 | Applied Informatics - Database Systems (Registration until 17 July 2023) | Oberweis |
| WT 23/24 79AIFB_DBS_CS | Applied Informatics – Database Systems | Oberweis |

- **Legend:**  
  - 🖥 Online,  
  - 🧩 Blended (On-Site/Online),  
  - 🗤 On-Site,  
  - ✗ Cancelled

**Competence Certificate**  
The assessment consists of a written exam (60 minutes) in the first week after lecture period.

**Modeled Conditions**  
The following conditions have to be fulfilled:

1. The course T-WIWI-102660 - Database Systems must not have been started.

**Annotation**  
Replaces from summer semester 2020 T-WIWI-102660 "Database Systems".

**Below you will find excerpts from events related to this course:**

**Lecture (V)**  
**On-Site**
Content
Database systems (DBS) play an important role in today’s companies. Internal and external data is stored and processed in databases in every company. The proper management and organization of data helps to solve many problems, enables simultaneous queries from multiple users and is the organizational and operational base for the entire working procedures and processes of the company. The lecture leads in the area of the database theory, covers the basics of database languages and database systems, considers basic concepts of object-oriented and XML databases, conveys the principles of multi-user control of databases and physical data organization. In addition, it gives an overview of business problems often encountered in practice such as:

- Correctness of data (operational, semantic integrity)
- Restore of a consistent database state
- Synchronization of parallel transactions (phantom problem).

Learning objectives:
Students
- are familiar with the concepts and principles of data base models, languages and systems and their applications and explain it,
- design and model relational data bases on the basis of theoretical foundations,
- create queries for relational databases,
- know how to handle enhanced data base problems occurring in the enterprises.

Workload:
- Lecture 30h
- Exercise 15h
- Preparation of lecture 24h
- Preparation of exercises 25h
- Exam preparation 40h
- Exam 1h

Literature


Weitere Literatur wird in der Vorlesung bekannt gegeben.

Exercises Applied Informatics - Database Systems
2511201, SS 2023, 1 SWS, Language: German, Open in study portal

Practice (Ü)
On-Site

Content
Database systems (DBS) play an enormously important role in today’s companies. The internal and external data is stored and processed in the database of the respective company. The correct management and organization of this data helps to solve numerous problems, enables simultaneous queries by several users and is the organizational and operational basis for the entire workflows and processes of the company.

The lecture introduces the field of database theory, covers the basics of database languages and database systems, teaches the principles of multi-user database control and physical data organization. In addition, it provides an overview of database problems often encountered in business practice, such as the correctness of data (operational, semantic integrity), the recovery of a consistent database state, and the synchronization of parallel transactions.

Literature

**Responsible:** Prof. Dr. Melanie Volkamer

**Organisation:** KIT Department of Economics and Management

**Part of:**
- M-WIWI-101426 - Electives in Informatics
- M-WIWI-105112 - Applied Informatics

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**Exams**

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<td>Applied Informatics – Information Security</td>
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**Competition Certificate**
The assessment of this course is a written examination (60 min) according to §4(2), 1 of the examination regulation or an oral exam (30 min) following §4, Abs. 2, 2 of the examination regulation, for which admission must be obtained through successful participation in the exercise during the semester. The exam takes place every semester and can be repeated at every regular examination date.

**Modeled Conditions**
The following conditions have to be fulfilled:

1. The course T-WIWI-108387 - Information Security must not have been started.

**Annotation**
Lecture and exercise will not be offered in the summer semester 2023.
8.17 Course: Applied Informatics – Modelling [T-WIWI-110338]

**Responsible:** Dr.-Ing. Michael Färber
Prof. Dr. Andreas Oberweis

**Organisation:** KIT Department of Economics and Management

**Part of:**
M-WIWI-101426 - Electives in Informatics
M-WIWI-105112 - Applied Informatics

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<td>2511031</td>
<td>Exercises to Applied Informatics - Modelling</td>
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<td>Practice/Oberweis, Schiefer, Schüler</td>
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**Exams**

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**Legend:** 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, 🗿 Cancelled

**Competence Certificate**
The assessment consists of a written examination (60 min) in the first week after lecture period (according to Section 4 (2),1 of the examination regulation).

**Prerequisites**
None

*Below you will find excerpts from events related to this course:*

**Applied Informatics - Modelling**
2511030, WS 23/24, 2 SWS, Language: German, Open in study portal

**Lecture (V)**
On-Site
Content
In the context of complex information systems, modelling is of central importance, e.g. – in the context of systems to be developed – for a better understanding of their functionality or in the context of existing systems for supporting maintenance and further development.

Modelling, in particular modelling of information systems, forms the core part of this lecture. The lecture is organized in two parts. The first part mainly covers the modelling of static aspects, the second part covers the modelling of dynamic aspects of information systems.

The lecture sets out with a definition of modelling and the advantages of modelling. After that, advanced aspects of UML, the Entity Relationship model (ER model) and logics as a means of modelling static aspects will be explained. This will be complemented by the relational data model and the systematic design of databases based on ER models. For modelling dynamic aspects, different types of petri-nets together with their respective analysis techniques will be introduced.

Learning objectives:
Students
- explain the strengths and weaknesses of various modeling approaches for Information Systems and choose an appropriate method for a given problem,
- create UML models, ER models and Petri nets for given problems,
- modelling given situations in propositional and predicate logic and can interpret them,
- analyze various properties in propositional and predicate logic,
- create and evaluate a relational database schema and express queries in relational algebra.

Workload:
- Total effort: 120-135 hours
- Presence time: 45 hours
- Self study: 75-90 hours

Literature

Weiterführende Literatur:
- U. Schöning. Logik für Informatiker. Spektrum Akademischer Verlag, 2000

Exercises to Applied Informatics - Modelling
2511031, WS 23/24, 1 SWS, Language: German, Open in study portal
Content
In the context of complex information systems, modelling is of central importance, e.g. – in the context of systems to be developed – for a better understanding of their functionality or in the context of existing systems for supporting maintenance and further development.

Modelling, in particular modelling of information systems, forms the core part of this lecture. The lecture is organized in two parts. The first part mainly covers the modelling of static aspects, the second part covers the modelling of dynamic aspects of information systems.

The lecture sets out with a definition of modelling and the advantages of modelling. After that, advanced aspects of UML, the Entity Relationship model (ER model) and logics as a means of modelling static aspects will be explained. This will be complemented by the relational data model and the systematic design of databases based on ER models. For modelling dynamic aspects, different types of petri-nets together with their respective analysis techniques will be introduced.

Learning objectives:
Students
- explain the strengths and weaknesses of various modeling approaches for Information Systems and choose an appropriate method for a given problem,
- create UML models, ER models and Petri nets for given problems,
- modelling given situations in propositional and predicate logic and can interpret them,
- analyze various properties in propositional and predicate logic,
- create and evaluate a relational database schema and express queries in relational algebra.

Workload:
- Total effort: 120-135 hours
- Presence time: 45 hours
- Self study: 75-90 hours

Organizational issues
Bei Bedarf wird ein Tutorium online angeboten.

Literature

Weiterführende Literatur:
- U. Schöning. Logik für Informatiker. Spektrum Akademischer Verlag, 2000

**Responsibility:** Prof. Dr. Ali Sunyaev  
**Organisation:** KIT Department of Economics and Management  
**Part of:**  
- M-WIWI-101426 - Electives in Informatics  
- M-WIWI-105112 - Applied Informatics

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<td>ST 2023 2511033</td>
<td>1 SWS</td>
<td>Practice</td>
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**Events**

- **ST 2023 2511032**  
  **Course:** Applied Informatics - Internet Computing  
  **Type:** Lecture  
  **Instructor:** Sunyaev

- **ST 2023 2511033**  
  **Course:** Übungen zu Angewandte Informatik - Internet Computing  
  **Type:** Practice  
  **Instructor:** Sunyaev, Rank, Guse

**Exams**

- **ST 2023 79AIFB_AI2_A2**  
  **Course:** Applied Informatics - Internet Computing (Registration until 17 July 2023)  
  **Instructor:** Sunyaev

- **WT 23/24 79AIFB_AI-IC_B4**  
  **Course:** Applied Informatics – Principles of Internet Computing: Foundations for Emerging Technologies and Future Services  
  **Instructor:** Sunyaev

**Legend:** Online, Blended (On-Site/Online), On-Site, Cancelled

**Competence Certificate**

The assessment consists of a written exam (60 min) according to Section 4(2), 1 of the examination regulation. The successful completion of the exercises is recommended for the written exam, which is offered at the end of the winter semester and at the end of the summer semester.

Successful participation in the exercise by submitting correct solutions to 50% of the exercises can earn a grade bonus. If the grade of the written exam is at least 4.0 and at most 1.3, the bonus will improve it by one grade level (i.e. by 0.3 or 0.4).

**Prerequisites**

None

**Annotation**

Replaces from winter semester 2019/2020 T-WIWI-109445 "Applied Informatics - Internet Computing".

Below you will find excerpts from events related to this course:

**Applied Informatics - Internet Computing**  
**2511032, SS 2023, 2 SWS, Language: German, Open in study portal**

**Lecture (V)**  
**On-Site**
Content
The lecture Applied Computer Science - Internet Computing provides insights into fundamental concepts and future technologies of distributed systems and Internet computing. Students should be able to select, design and apply the presented concepts and technologies. The course first introduces basic concepts of distributed systems (e.g. design of architectures for distributed systems, internet architectures, web services, middleware).

In the second part of the course, emerging technologies of Internet computing will be examined in depth. These include, among others:

- Cloud Computing
- Edge & Fog Computing
- Internet of Things
- Blockchain
- Artificial Intelligence

Learning objectives:
The student learns about basic concepts and emerging technologies of distributed systems and internet computing. Practical topics will be deepened in lab classes.

Recommendations:
Knowledge of content of the module [WI1INFO].

Workload:
The total workload for this course is approximately 135-150 hours.

Literature
Wird in der Vorlesung bekannt gegeben

**Responsible:** Prof. Dr. Andreas Oberweis

**Organisation:** KIT Department of Economics and Management

**Part of:**
- M-WIWI-101426 - Electives in Informatics
- M-WIWI-105112 - Applied Informatics

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**Events**

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<th>Lecture / 🗣</th>
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<td>Übungen zu Angewandte Informatik - Software Engineering</td>
<td>1 SWS</td>
<td>Practice / 🗣</td>
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**Exams**

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Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, × Cancelled

**Competence Certificate**
The assessment consists of an 1h written exam in the first week after lecture period.

**Modeled Conditions**
The following conditions have to be fulfilled:

1. The course T-WIWI-100809 - Software Engineering must not have been started.

Below you will find excerpts from events related to this course:

**Applied Informatics - Software Engineering**

<table>
<thead>
<tr>
<th>2511206, SS 2023, 2 SWS, Language: German, Open in study portal</th>
<th>Lecture (V)</th>
<th>On-Site</th>
</tr>
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</table>
Content
The course deals with fundamental aspects of the systematically development of huge software systems. The course covers topics such as:

- software developing process models
- methods and tools for the development phases: requirements analysis, system specification, system design, programming and testing.

Learning objectives:
Students

- are familiar with the concepts and principles of software engineering and can discuss it,
- know common software development process models and their strengths and weaknesses and can discuss it,
- know methods for requirements analysis and can use it and can model and evaluate use case models,
- know models for systems structuring and controlling as well as architecture principles of software systems and can discuss it.
- can model and evaluate component diagrams
- are familiar with basic concepts of software quality management and are able to apply software test and evaluation methods in concrete situations.

Workload:

- Lecture 30h
- Exercise 15h
- Preparation of lecture 24h
- Preparation of exercises 25h
- Exam preparation 40h
- Exam 1h

Literature


Weitere Literatur wird in der Vorlesung bekannt gegeben.
8.20 Course: Artificial Intelligence in Production [T-MACH-112115]

**Responsible:** Prof. Dr.-Ing. Jürgen Fleischer

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-106590 - Production Engineering

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<td>Artificial Intelligence in Production</td>
<td>2</td>
<td>Lecture / 🧩</td>
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**Exams**

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</table>

**Competence Certificate**

Written Exam (90 min)

**Prerequisites**

none

*Below you will find excerpts from events related to this course:*

**Artificial Intelligence in Production**

2149921, WS 23/24, 2 SWS, Language: German, Open in study portal

Lecture (V) Blended (On-Site/Online)
Content
The module AI in Production is designed to teach students the practical, holistic integration of machine learning and artificial intelligence methods in production. The course is oriented towards the phases of the CRISP-DM process with the aim of developing a deep understanding of the necessary steps and content-related aspects (methods) within the individual phases. In addition to teaching the practical aspects of integrating the most important machine learning methods, the focus is primarily on the necessary steps for data generation and data preparation as well as the implementation and validation of the methods in an industrial environment.

The lecture "Artificial Intelligence in Production" deals with the theoretical basics in a practical context. Here, the six phases of the CRISP-DM process are run through sequentially and the necessary basics for the implementation of the respective phases are taught. The course first deals with the data sources that are prevalent in the production environment. Subsequently, possibilities for target-oriented data acquisition as well as data transfer and data storage are introduced. Possibilities for data filtering and data preprocessing are discussed and production-relevant aspects are pointed out. The course then covers in detail the necessary algorithms and procedures for implementing AI in production, before techniques and fundamentals for making the models permanent in production (deployment) are discussed.

Learning Outcomes:
The students
- understand the relevance for the application of AI in production and know the main drivers and challenges.
- will understand the CRISP-DM process for implementing AI projects in manufacturing. Students will be able to name the main data sources, data ingestion methods, communication architectures, models and methods for data processing.
- will understand the main machine learning techniques and be able to contrast and select them in the context of industrial issues.
- are able to assess whether a specific problem in the context of production can be solved in a target-oriented manner using machine learning methods, as well as what the necessary steps are for implementation.
- are able to assess the most important challenges and name possible approaches to solve them.
- are able to apply the phases of the CRISP-DM to a problem in production. Students will know the steps necessary to build a data pipeline and will be able to do so theoretically in the context of a real-world use case.
- are able to evaluate the results of common deep learning methods and, based on this, to theoretically elaborate and theoretically apply proposed solutions (from the field of machine learning).

Workload:
MACH:
regular attendance: 31.5 hours
self-study: 88.5 hours

WING:
regular attendance: 31.5 hours
self-study: 118.5 hours

Organizational issues
Vorlesungstermine freitags 14:00 Uhr, Übungstermine freitags 15:45 Uhr. Bekanntgabe der konkreten Übungstermine erfolgt in der ersten Vorlesung.

Zur Vertiefung des im Rahmen der Lehrveranstaltung erworbenen Wissens werden die theoretischen Vorlesungseinheiten durch Praxiseinheiten im Umfeld der Karlsruher Forschungsfabrik (https://www.karlsruher-forschungsfabrik.de) unterstützt.

The theoretical lectures are complemented by practical lectures in the Karlsruhe Research Factory (https://www.karlsruher-forschungsfabrik.de/en.html) to deepen the acquired knowledge.

Literature
Skript zur Veranstaltung wird über Ilias (https://ilias.studium.kit.edu/) bereitgestellt.

Lecture notes will be provided in Ilias (https://ilias.studium.kit.edu/).
8.21 Course: Auction & Mechanism Design [T-WIWI-102876]

Responsible: Prof. Dr. Nora Szech
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101499 - Applied Microeconomics
M-WIWI-101501 - Economic Theory

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Events

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<td>Lecture / 🗣</td>
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Exams

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Legend: Online, 🔄 Blended (On-Site/Online), 🗣 On-Site, ❌ Cancelled

Competence Certificate

The assessment consists of a written exam (60 minutes) (following §4(2), 1 of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

A bonus can be earned through successful participation in the exercise. If the grade of the written examination is between 4.0 and 1.3, the bonus improves the grade by one grade level (0.3 or 0.4). The exact criteria for awarding a bonus will be announced at the beginning of the course.

Prerequisites

None

Recommendation

Basic knowledge of microeconomics and statistics are recommended. A background in game theory is helpful, but not absolutely necessary.

Annotation

The lecture will be held in English.

Below you will find excerpts from events related to this course:

Digitale Märkte und Mechanismen
2560550, SS 2023, 2 SWS, Language: German, Open in study portal
Content
The course starts with the basic theory of equilibrium behavior and revenue management in one object standard auctions. The revenue equivalence theorem for standard auctions is introduced. Thereafter, the course focuses on mechanism design and its applications to one object auctions and bilateral trade.

The students

- learn to analyze strategic behavior in auctions;
- learn to compare auction formats with regard to efficiency and revenue;
- are familiarized with the basic theory of (Bayesian) mechanism design;
- learn to master the revenue equivalence theorem for standard auctions;
- learn to apply mechanism design to one object auctions and bilateral trade.

The lecture will be held in English.

It depends on the future pandemic development if the assessment will be in the form of an open-book-exam (Prüfungsleistung anderer Art, SPO § 4 Abs. 2, Pkt. 3) or in the form of a written exam (60 minutes) (SPO §4 (2), 1).

The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

Through successful participation in the Exercise, students can earn a bonus. If the grade on the written exam is between 4,0 and 1,3 the bonus improves the grade by one step (0,3 or 0,4). Details will be announced during the lecture.

The total workload for this course is approximately 135.0 hours. For further information see German version.

Recommendations:
Basic knowledge of microeconomics and statistics are recommended. A background in game theory is helpful, but not absolutely necessary.

Literature
8.22 Course: Automotive Engineering I [T-MACH-102203]

**Responsible:** Prof. Dr. Frank Gauterin  
Dr.-Ing. Martin Gießler

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101266 - Automotive Engineering

<table>
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<td>Each winter term</td>
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**Exams**

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**Legend:** Online, 🟪 Blended (On-Site/Online), 🔴 On-Site, ✗ Cancelled

**Competence Certificate**

Written examination

**Duration:** 120 minutes

**Auxiliary means:** none

**Modeled Conditions**

The following conditions have to be fulfilled:

1. The course T-MACH-100092 - Automotive Engineering I must not have been started.

*Below you will find excerpts from events related to this course:*

**Automotive Engineering I**

2113809, WS 23/24, 4 SWS, Language: English, Open in study portal

**Content**

1. History and future of the automobile

2. Driving mechanics: driving resistances and driving performances, mechanics of longitudinal and lateral forces, active and passive safety

3. Drive systems: combustion engine, hybrid and electric drive systems

4. Transmission: clutches (e.g. friction clutch, visco clutch), transmission (e.g. mechanical transmission, hydraulic fluid transmission)

5. Power transmission and distribution: drive shafts, cardon joints, differentials

**Learning Objectives:**

The students know the movements and the forces at the vehicle and are familiar with active and passive safety. They have proper knowledge about operation of engines and alternative drives, the necessary transmission between engine and drive wheels and the power distribution. They have an overview of the components necessary for the drive and have the basic knowledge, to analyze, to evaluate, and to develop the complex system "vehicle".
Organizational issues
You will find the lecture material on ILIAS. To get the ILIAS password, KIT students refer to https://fast-web-01.fast.kit.edu/PasswoerterIlias/, students from eucor universities send an e-mail to martina.kaiser@kit.edu
Kann nicht mit LV Grundlagen der Fahrzeugtechnik I [2113805] kombiniert werden.
Can not be combined with lecture [2113805] Grundlagen der Fahrzeugtechnik I.

Literature
8.23 Course: Automotive Engineering I [T-MACH-100092]

**Responsible:** Prof. Dr. Frank Gauterin  
Dr.-Ing. Martin Gießler  

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101266 - Automotive Engineering

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**Legend:**  
🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✗ Canceled

**Competence Certificate**

Written examination

**Duration:** 120 minutes

**Auxiliary means:** none

**Prerequisites**

The brick "T-MACH-102203 - Automotive Engineering I" is not started or finished. The bricks "T-MACH-100092 - Grundlagen der Fahrzeugtechnik I" and "T-MACH-102203 - Automotive Engineering I" can not be combined.

**Below you will find excerpts from events related to this course:**

**Automotive Engineering I**

2113805, WS 23/24, 4 SWS, Language: German, Open in study portal

**Lecture (V)**

On-Site

**Content**

1. History and future of the automobile
2. Driving mechanics: driving resistances and driving performance, mechanics of longitudinal and lateral forces, active and passive safety
3. Drive systems: combustion engine, hybrid and electric drive systems
4. Transmission: clutches (e.g. friction clutch, visco clutch), transmission (e.g. mechanical transmission, hydraulic fluid transmission)
5. Power transmission and distribution: drive shafts, cardon joints, differentials

**Learning Objectives:**

The students know the movements and the forces at the vehicle and are familiar with active and passive safety. They have proper knowledge about operation of engines and alternative drives, the necessary transmission between engine and drive wheels and the power distribution. They have an overview of the components necessary for the drive and have the basic knowledge, to analyze, to evaluate, and to develop the complex system "vehicle".
Organizational issues
Das Vorlesungsmaterial wird auf ILIAS bereitgestellt. Das ILIAS-Passwort erhalten Sie unter https://fast-web-01.fast.kit.edu/PasswoerterILIAS/
Kann nicht mit der Veranstaltung [2113809] kombiniert werden.
Can not be combined with lecture [2113809].

Literature

Automotive Engineering I
2113809, WS 23/24, 4 SWS, Language: English, Open in study portal

Content
1. History and future of the automobile
2. Driving mechanics: driving resistances and driving performances, mechanics of longitudinal and lateral forces, active and passive safety
3. Drive systems: combustion engine, hybrid and electric drive systems
4. Transmission: clutches (e.g. friction clutch, visco clutch), transmission (e.g. mechanical transmission, hydraulic fluid transmission)
5. Power transmission and distribution: drive shafts, cardon joints, differentials

Learning Objectives:
The students know the movements and the forces at the vehicle and are familiar with active and passive safety. They have proper knowledge about operation of engines and alternative drives, the necessary transmission between engine and drive wheels and the power distribution. They have an overview of the components necessary for the drive and have the basic knowledge, to analyze, to evaluate, and to develop the complex system "vehicle".

Organizational issues
You will find the lecture material on ILIAS. To get the ILIAS password, KIT students refer to https://fast-web-01.fast.kit.edu/PasswoerterILIAS/, students from eucor universities send an e-mail to martina.kaiser@kit.edu
Kann nicht mit LV Grundlagen der Fahrzeugtechnik I [2113805] kombiniert werden.
Can not be combined with lecture [2113805] Grundlagen der Fahrzeugtechnik I.

Literature
8.24 Course: Automotive Engineering II [T-MACH-102117]

Responsible: Prof. Dr. Frank Gauterin  
Dr.-Ing. Martin Gießler

Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101266 - Automotive Engineering

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Exams

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Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 📣 On-Site, ✗ Cancelled

Competence Certificate
Written Examination
Duration: 90 minutes
Auxiliary means: none
Prerequisites
none

Below you will find excerpts from events related to this course:

Automotive Engineering II
2114835, SS 2023, 2 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Content
1. Chassis: Wheel suspensions (rear axles, front axles, kinematics of axles), tyres, springs, damping devices
2. Steering elements: Manual steering, servo steering, steer by wire
3. Brakes: Disc brake, drum brake, comparison of designs

Learning Objectives:
The students have an overview of the modules which are necessary for the tracking of a motor vehicle and the power transmission between vehicle bodywork and roadway. They have knowledge of different wheel suspensions, tyres, steering elements, and brakes. They know different design versions, functions and the influence on driving and braking behavior. They are able to correctly develop the appropriate components. They are ready to analyze, to evaluate, and to optimize the complex interaction of the different components under consideration of boundary conditions.

Organizational issues
Kann nicht mit der Veranstaltung [2114855] kombiniert werden.
Can not be combined with lecture [2114855]
Automotive Engineering II
2114855, SS 2023, 2 SWS, Language: English, Open in study portal

Content

1. Chassis: Wheel suspensions (rear axles, front axles, kinematics of axles), tyres, springs, damping devices
2. Steering elements: Manual steering, servo steering, steer by wire
3. Brakes: Disc brake, drum brake, comparison of the designs

Learning Objectives:
The students have an overview of the modules which are necessary for the tracking of a motor vehicle and the power transmission between vehicle and roadway. They have knowledge of different wheel suspensions, tyres, steering elements, and brakes. They know different design versions, functions and the influence on driving and braking behavior. They are able to correctly develop the appropriate components. They are ready to analyze, to evaluate, and to optimize the complex interaction of the different components under consideration of boundary conditions.

Literature


Elective literature:

**Responsible:** Prof. Dr. Martin Klarmann

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-101424 - Foundations of Marketing

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Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

**Competence Certificate**

The assessment of success takes place through the preparation and presentation of a sales presentation based on a case study (max 30 points) and a written exam with additional aids in the sense of an open book exam (max. 60 points). In total, a maximum of 90 points can be achieved in the course. Further details will be announced during the lecture.

**Prerequisites**

None.

**Annotation**

Starting in the winter semester 22/23, the course will be scheduled to be completed after the first half of the semester. For further information, please contact Marketing and Sales Research Group (marketing.iism.kit.edu).

Below you will find excerpts from events related to this course:

**B2B Sales Management**

2572187, WS 23/24, 2 SWS, Language: German, Open in study portal
Content
The event is designed to teach you taking on marketing responsibility in a very special business environment. This involves companies that sell and market their (often technically highly complex) products themselves to other companies, which is referred to as "business-to-business" (B2B) marketing and sales. Since traditional communication instruments (e.g. advertising) often hardly work in this environment and many projects lead to a long-term cooperation between supplier and customer, (personal) sales play a special role in marketing. Therefore, this event introduces marketing in B2B markets on the one hand and deals with questions of sales and distribution on the other hand.

Topics with regard to B2B sales management are:

- Basic aspects of B2B sales and B2B purchasing
- Understanding of marketing challenges in specific B2B business types (commodities, systems, solutions)
- Value pricing and value-based selling
- Organizational buying behavior
- Basics of B2B customer relationship management (e.g. key account management, reference customer management)
- Sales process (lead generation, sales presentations, customer-oriented selling, closing)
- Sales automation

Learning objectives
Students

- Are familiar with marketing and sales peculiarities and challenges in B2B environments
- Are able to identify different B2B business types and their marketing characteristics
- Are familiar with central theories of organizational buying behavior
- Are familiar with central objectives of Customer Relationship Management in B2B environments and are able to implement them with appropriate tools
- Are able to prioritize customers and calculate B2B Customer Lifetime Value
- Know how B2B sales presentations work and have also gained practical experience in this area
- Are able to determine value-based prices

Workload
The total workload for this course is approximately 135.0 hours.
Attendance time: 35.0 hours
Self-study: 100.0 hours

Organization
A detailed schedule will be announced.

Literature
8.26 Course: Bachelor's Thesis [T-WIWI-103067]

**Responsible:** Studiendekan des KIT-Studienganges

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-101601 - Module Bachelor's Thesis

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**Competence Certificate**
see module description

**Prerequisites**
see module description

**Final Thesis**
This course represents a final thesis. The following periods have been supplied:

- **Submission deadline:** 6 months
- **Maximum extension period:** 1 month
- **Correction period:** 6 weeks
### 8.27 Course: Basic Principles of Economic Policy [T-WIWI-103213]

**Responsible:** Prof. Dr. Ingrid Ott  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101668 - Economic Policy I

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**Competence Certificate**  
Depending on further pandemic developments, the examination will be offered either as a 60-minute written examination (written examination according to SPO § 4 Abs. 2, Pkt. 1) or as an open-book examination (alternative exam assessment according to SPO § 4 Abs. 2, Pkt. 3).

**Prerequisites**  
None

**Recommendation**  
Basic knowledge of micro- and macroeconomics is assumed, as taught in the courses Economics I [2610012], and Economics II [2600014].

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Industrial Engineering and Management B.Sc.  
Module Handbook as of 04/10/2023  
179
Annotation
Please note that the lecture will not be held in summer semester 2021. The exam is offered.

Description:
Theory of general economic policy and discussion of current economic policy topics:

- Goals of economic policy,
- Instruments and institutions of economic policy,
- Triad of regional, national and European economic policies,
- special fields of economic policy, in particular growth, employment, provision of public infrastructure and climate policy.

Learning objectives:
Students learn:

- To apply basic concepts of micro- and macroeconomic theories to economic policy issues.
- to develop arguments on how state intervention in the market can be legitimized from a welfare economic perspective
- to derive theory-based policy recommendations.

Learning content:

- Market interventions: microeconomic perspective
- Market interventions: macroeconomic perspective
- Institutional economic aspects
- Economic policy and welfare economics
- Economic policy makers: Political-economic aspects

Workload:

- Total effort at 4.5 LP: approx. 135 hours
- Presence time: approx. 30 hours
- Self-study: approx. 105 hours

Media:
See course announcement

References:
See course announcement

Below you will find excerpts from events related to this course:

Basic Principles of Economic Policy
2560280, SS 2023, 2 SWS, Language: German, Open in study portal
Content
The lecture deals with theories of general economic policy and discussion of current economic policy topics:

- Goals of economic policy,
- Instruments and institutions of economic policy,
- Triad of regional, national and European economic policies,
- special fields of economic policy, in particular growth, employment, provision of public infrastructure and climate policy.

Learning objectives:
Students shall be given the ability to

- apply basic concepts of micro- and macroeconomic theories to economic policy issues
- develop arguments on how state intervention in the market can be legitimized from a welfare economic perspective
- derive theory-based policy recommendations

Recommendations:
Basic micro- and macroeconomic knowledge is required, especially as taught in the courses Economics I [2610012] and Economics II [2600014].

Workload:
Total effort at 4.5 LP is approx. 135 hours and consists of:

- Presence time: approx. 30 hours
- Self-study: approx. 105 hours

Assessment:
The examination takes place in the form of a written examination (60min) (according to §4(2), 1 SPO). The examination is offered every semester and can be repeated at any regular examination date.

Organizational issues
Zugehörige Veranstaltung: Übungen zur Einführung in die Wirtschaftspolitik [2560281]

Literature

- Foliensatz zur Vorlesung
- Übungsaufgaben

Exercises of Basic Principles of Economic Policy
2560281, SS 2023, 1 SWS, Language: German, Open in study portal

Organizational issues
Zugehörige Veranstaltung: [2560280] Einführung in die Wirtschaftspolitik

Literature

- Foliensatz zur Vorlesung
- Übungsaufgaben
**8.28 Course: Basics of German Company Tax Law and Tax Planning [T-WIWI-108711]**

**Responsible:** Dr. Gerd Gutekunst  
Prof. Dr. Berthold Wigger

**Organisation:** KIT Department of Economics and Management

**Part of:**  
M-WIWI-101403 - Public Finance  
M-WIWI-101423 - Topics in Finance II  
M-WIWI-101465 - Topics in Finance I

**Type**  
Written examination

**Credits**  
4,5

**Grading scale**  
Grade to a third

**Recurrence**  
Each winter term  
Version 2

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### Events

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### Competence Certificate

Depending on the further pandemic development the assessment will consist either of an open book exam (following Art. 4, para. 2, clause 3 of the examination regulation), or of an 1.5 h written exam (following Art. 4, para. 2, clause 1 of the examination regulation).

### Prerequisites

None

### Recommendation

Knowledge of the collection of public revenues is assumed. Therefore it is recommended to attend the course “Öffentliche Einnahmen” beforehand.

---

**Below you will find excerpts from events related to this course:**

**V Basics of German Company Tax Law and Tax Planning**  
2560134, WS 23/24, 3 SWS, Language: German, Open in study portal

**Content**

**Workload:**

The total workload for this course is approximately 135.0 hours. For further information see German version.
8.29 Course: Basics of Technical Logistics I [T-MACH-109919]

- **Responsible:** Dr.-Ing. Martin Mittwollen, Dr.-Ing. Jan Oellerich
- **Organisation:** KIT Department of Mechanical Engineering
- **Part of:** M-MACH-101279 - Technical Logistics

**Events**

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**Competence Certificate**
The assessment consists of a written exam (60 min.) according to § 4 paragraph 2 Nr. 1 of the examination regulation.

**Prerequisites**
none

**Recommendation**
Knowledge of the basics of technical mechanics preconditioned.

**Below you will find excerpts from events related to this course:**

- **Basics of Technical Logistics I**

  - **Code:** 2117095, **WS 23/24**, **4 SWS**, **Language:** German
  - **Type:** Lecture / Practice (VÜ)
  - **On-Site**
  - **Open in study portal**

**Content**

- effect model of conveyor machines
- elements for the change of position and orientation
- conveyor processes
- identification systems
- drives
- mechanical behaviour of conveyors
- structure and function of conveyor machines
- elements of intralogistics
- sample applications and calculations in addition to the lectures inside practical lectures

**Students are able to:**

- Describe processes and machines of technical logistics.
- Model the fundamental structures and the impacts of material handling machines with mathematical models.
- Refer to industrially used machines.
- Model real machines applying knowledge from lessons and calculate their dimensions.
Organizational issues
Die Erfolgskontrolle erfolgt in Form einer schriftlichen oder mündlichen Prüfung (nach §4 (2), 1 bzw. 2SPO).
The assessment consists of a written or oral exam according to Section 4 (2), 1 or 2 of the examination regulation.
Es wird Kenntnis der Grundlagen der Technischen Mechanik vorausgesetzt.
Basics knowledge of technical mechanics is preconditioned.
Ergänzungsblätter, Präsentationen, Tafel.
Supplementary sheets, presentations, blackboard.
Präsenz: 48 Std
Nacharbeit: 132 Std
presence: 48h
rework: 132h

Literature
Empfehlungen in der Vorlesung / Recommendations during lessons
### 8.30 Course: Basics of Technical Logistics II [T-MACH-109920]

**Responsible:** Prof. Dr.-Ing. Kai Furmans

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101279 - Technical Logistics

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**Competence Certificate**

The assessment consists of a written exam (60 min.) according to § 4 paragraph 2 Nr. 1 of the examination regulation.

**Prerequisites**

none

**Recommendation**

Knowledge of the basics of technical mechanics and out of "Basic of Technical Logistics I" (T-MACH-109919) preconditioned.
8 COURSES
Course: BioMEMS - Microsystems Technologies for Life-Sciences and Medicine II [T-MACH-100967]

8.31 Course: BioMEMS - Microsystems Technologies for Life-Sciences and Medicine II [T-MACH-100967]

Responsible: Prof. Dr. Andreas Guber
Organisation: KIT Department of Mechanical Engineering
Part of: M-MACH-101287 - Microsystem Technology

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Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✗ Cancelled

Competence Certificate
Written exam (75 Min.)

Prerequisites
none

Below you will find excerpts from events related to this course:

BioMEMS - Microsystems Technologies for Life-Sciences and Medicine II
2142883, SS 2023, 2 SWS, Language: German, Open in study portal

Lecture (V)
Online

Content
Examples of use in Life-Sciences and biomedicine: Microfluidic Systems:
LabCD, Protein Crystallisation
Microarrays
Tissue Engineering
Cell Chip Systems
Drug Delivery Systems
Micro reaction technology
Microfluidic Cells for FTIR-Spectroscopy
Microsystem Technology for Anesthesia, Intensive Care and Infusion
Analysis Systems of Person’s Breath
Neurobionics and Neuroprosthesis
Nano Surgery

Organizational issues
Zu jedem Vorlesungstermin werden via ILIAS die jeweiligen Folien im PDF-Format zur Verfügung gestellt.
Prüfung:
Montag, 11.09.2023 - 12:15 - 14:15; 10.11, Hertz-Hörsaal

Literature
Menz, W., Mohr, J., O. Paul: Mikrosystemtechnik für Ingenieure, VCH-Verlag, Weinheim, 2005
Buess, G.: Operationslehre in der endoskopischen Chirurgie, Band I und II; Springer-Verlag, 1994
M. Madou
Fundamentals of Microfabrication
8.32 Course: BioMEMS - Microsystems Technologies for Life-Sciences and Medicine III [T-MACH-100968]

**Responsible:** Prof. Dr. Andreas Guber  
**Organisation:** KIT Department of Mechanical Engineering  
**Part of:** M-MACH-101287 - Microsystem Technology

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**Events**

| ST 2023 | 2142879 | BioMEMS - Microsystems Technologies for Life-Sciences and Medicine III | 2 SWS | Lecture / 🖥 | Guber, Ahrens |

**Exams**

| ST 2023 | 76-T-MACH-100968 | BioMEMS - Microsystems Technologies for Life-Sciences and Medicine III | Guber |

Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✗ Cancelled

**Competence Certificate**

Written exam (75 Min.)

**Prerequisites**

none

**Below you will find excerpts from events related to this course:**

**BioMEMS - Microsystems Technologies for Life-Sciences and Medicine III**

2142879, SS 2023, 2 SWS, Language: German, [Open in study portal](#)

**Content**

Examples of use in minimally invasive therapy  
Minimally invasive surgery (MIS)  
Endoscopic neurosurgery  
Interventional cardiology  
NOTES  
OP-robots and Endosystems  
License of Medical Products and Quality Management

**Organizational issues**

Zu jedem Vorlesungstermin werden via ILIAS die jeweiligen Folien im PDF-Format zur Verfügung gestellt.

Prüfung:  
Montag, 25.09.2023 - 11:00 - 13:00; 10.11, Hertz-Hörsaal

**Literature**

Menz, W., Mohr, J., O. Paul: Mikrosystemtechnik für Ingenieure, VCH-Verlag, Weinheim, 2005  
Buess, G.: Operationslehre in der endoskopischen Chirurgie, Band I und II; Springer-Verlag, 1994  
M. Madou  
Fundamentals of Microfabrication
8.33 Course: Boosting of Combustion Engines [T-MACH-105649]

**Responsible:** Dr.-Ing. Johannes Kech  
Dr.-Ing. Heiko Kubach

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101303 - Combustion Engines II

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**Events**

| ST 2023 | 2134153 | Boosting of Combustion Engines and Fuel Cells | 2 SWS | / 🗣️ | Kech |

Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣️ On-Site, 🗣️ Canceled

**Competence Certificate**
oral exam, 20 min

**Prerequisites**
none
Course: Brand Management [T-WIWI-112156]

**Responsible:** Prof. Dr. Ann-Kristin Kupfer  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101424 - Foundations of Marketing

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**Exams**

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**Competence Certificate**

The assessment of success will be done by the preparation and presentation of a case study as well as a written exam. Further details will be announced during the lecture.

**Prerequisites**

None

**Recommendation**

Students are highly encouraged to actively participate in class.

**Below you will find excerpts from events related to this course:**

**Brand Management**

2572190, WS 23/24, 2 SWS, Language: English, [Open in study portal](#)  
Lecture (V) On-Site

**Content**

Students learn the theoretical foundations of brand management and its most important concepts. They learn both about the importance of brands for consumers as well as the importance of brands for firms. Special emphasis will be given to the development of brand strategies. Furthermore, students will learn how to evaluate and apply brand instruments. A tutorial offers the opportunity to apply the key learnings of the lecture using case studies.

The learning objectives are as follows:

- Getting to know the theoretical foundations of brand management
- Evaluating strategic branding options (e.g., relating to the development of the core of the brand and the brand architecture) and operative brand instruments (e.g., relating to the brand name and logo)
- Fostering critical and analytical thinking skills and the application of knowledge to marketing problems
- Improving English skills

**Total time required for 4.5 credit points:** approx. 135 hours  
**Attendance time:** 30 hours  
**Self-study:** 105 hours
8 COURSES

8.35 Course: Business Strategies of Banks [T-WIWI-102626]

| Responsible:   | Prof. Dr. Wolfgang Müller |
| Organisation:  | KIT Department of Economics and Management |
| Part of:       | M-WIWI-101423 - Topics in Finance II |
|                | M-WIWI-101465 - Topics in Finance I |

| Type          | Written examination |
| Credits       | 3 |
| Grading scale | Grade to a third |
| Recurrence    | see Annotations |
| Version       | 1 |

Competence Certificate
The lecture will be offered for the last time in the winter semester 2021/22. The exam will take place for the last time in the summer semester 2022 (only for repeaters).

Prerequisites
None

Recommendation
None

Annotation
The lecture will be offered for the last time in the winter semester 2021/22.
8.36 Course: CAD-NX Training Course [T-MACH-102187]

**Responsible:** Prof. Dr.-Ing. Jivka Ovtcharova  
**Organisation:** KIT Department of Mechanical Engineering  
**Part of:** M-MACH-101270 - Product Lifecycle Management

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**Exams**

| ST 2023 | 76-T-MACH-102187 | CAD-NX Training Course | Ovtcharova |

**Legend:** 🖥 Online, 🧩 Blended (On-Site/Online), 🔴 On-Site, ✗ Cancelled

**Competence Certificate**  
Practical verification as academic achievement by working on a design task on the CAD computer, duration: 60 min.

**Prerequisites**  
None

**Recommendation**  
Dealing with technical drawings is required.

**Annotation**  
For the practical course compulsory attendance exists.

Below you will find excerpts from events related to this course:

**CAD-NX training course**  
2123357, SS 2023, 2 SWS, Language: German/English, Open in study portal

**Content**

- Overview of the functional range  
- Introduction to the work environment of NX  
- Basics of 3D-CAD modelling  
- Feature-based modelling  
- Freeform modelling  
- Generation of technical drawings  
- Assembly modelling  
- Finite element method (FEM) and multi-body simulation (MBS) with NX

Students are able to:

- create their own 3D geometric models in the CAD system NX and generate drawings due to the created geometry  
- carry out FE-studies and kinematic simulations using the integrated CAE tools  
- use advanced, knowledge-based functionalities of NX to automate the creation of geometry and thus to ensure the reusability of the models.

**Organizational issues**  
Das Praktikum wird zum einen vorlesungsbegleitend sowie zum anderen als einwöchige Blockveranstaltung in der vorlesungsfreien Zeit angeboten. Weitere Informationen siehe ILIAS.
Content

- Overview of the functional range
- Introduction to the work environment of NX
- Basics of 3D-CAD modelling
- Feature-based modelling
- Freeform modelling
- Generation of technical drawings
- Assembly modelling
- Finite element method (FEM) and multi-body simulation (MBS) with NX

Students are able to:

- create their own 3D geometric models in the CAD system NX and generate drawings due to the created geometry
- carry out FE-studies and kinematic simulations using the integrated CAE tools
- use advanced, knowledge-based functionalities of NX to automate the creation of geometry and thus to ensure the reusability of the models.

Organizational issues
Das Praktikum kann entweder vorlesungsbegleitend oder als einwöchige Blockveranstaltung in der vorlesungsfreien Zeit absolviert werden. Weitere Informationen siehe ILIAS.

Literature
Praktikumsskript

CAD-NX training course
2123357, WS 23/24, 2 SWS, Language: German, Open in study portal

Practical course (P)
Blended (On-Site/Online)
8.37 Course: Civil Law for Beginners [T-INFO-103339]

**Responsible:** Dr. Yvonne Matz
**Organisation:** KIT Department of Informatics
**Part of:** M-INFO-105084 - Public and Civil Law

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Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✗ Cancelled
### 8.38 Course: Climatology [T-PHYS-101092]

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**Responsible:** Prof. Dr. Joaquim José Ginete Werner Pinto

**Organisation:** KIT Department of Physics

**Part of:** M-WIWI-104838 - Introduction to Natural Hazards and Risk Analysis

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**Exams**

**Prerequisites**

none

**Legend:** 🖥 Online, 📚 Blended (On-Site/Online), 🗣 On-Site, ✗ Cancelled
Course: CO2-Neutral Combustion Engines and their Fuels I [T-MACH-111550]

**Responsible:** Prof. Dr. Thomas Koch

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101275 - Combustion Engines I

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**Legend:** 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ❌ Cancelled

**Competence Certificate**

oral examination, Duration: 25 min., no auxiliary means

**Prerequisites**

none

Below you will find excerpts from events related to this course:

**CO2-neutral combustion engines and their fuels I**

2133113, WS 23/24, 4 SWS, Language: German, Open in study portal

**Content**

Introduction, Presentation of IFKM

Working Principle

Characteristic Parameters

Engine Parts

Drive Train

Fuels

Gasoline Engines

Diesel Engines

Hydrogen Engines

Exhaust Gas Emissions

**Organizational issues**

Übungstermine Donnerstags nach Bekanntgabe in der Vorlesung
**8.40 Course: CO2-Neutral Combustion Engines and their Fuels II [T-MACH-111560]**

Responsible: Prof. Dr. Thomas Koch  
Organisation: KIT Department of Mechanical Engineering  
Part of: M-MACH-101303 - Combustion Engines II

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<th>Lecture / Practice /</th>
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**Exams**

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<th>Combustion Engines, Hydrogen Engines and CO2 neutral Fuels II</th>
<th>Koch, Kubach</th>
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Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ❌ Cancelled

**Competence Certificate**  
oral examination, duration: 25 minutes, no auxiliary means

**Prerequisites**  
none

**Recommendation**  
Fundamentals of Combustion Engines II helpful

Below you will find excerpts from events related to this course:

**CO2-neutral combustion engines and their fuels II**  
2134151, SS 2023, 3 SWS, Language: German, Open in study portal  
Lecture / Practice (VÜ)  
On-Site
Course: Competition in Networks [T-WIWI-100005]

**Responsibility:** Prof. Dr. Kay Mitusch

**Organisation:** KIT Department of Economics and Management

**Part of:**
- M-WIWI-101422 - Specialization in Customer Relationship Management
- M-WIWI-101499 - Applied Microeconomics
- M-WIWI-101668 - Economic Policy I

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**Competence Certificate**

Result of success is made by a 60 minutes written examination during the semester break (according to §4(2), 1 ERSC). Examination is offered every semester and can be retried at any regular examination date.

**Prerequisites**

None.

**Recommendation**

Basics of microeconomics obtained within the undergraduate programme (B.Sc) of economics are required.

**Below you will find excerpts from events related to this course:**

**Content**

Network or infrastructure industries like telecommunication, transport, and utilities form the backbone of modern economies. The lecture provides an overview of the economic characteristics of network industries. The planning of networks is complicated by the multitude of aspects involved (like spatial differentiation and the like). The interactions of different companies - competition or cooperation or both - are characterized by complex interdependencies within the networks: network effects, economies of scale, effects of vertical integration, switching costs, standardization, compatibility etc. appear increasingly in these sectors and even tend to appear in combination. Additionally, government interventions can often be observed, partly driven by the aims of competition policy and partly driven by the aims industrial policy. All these issues are brought up, analyzed formally (in part) and illustrated by several examples in the lecture.

**Literature**

Literatur und Skripte werden in der Veranstaltung angegeben.
# 8.42 Course: Complex Analysis and Integral Transformations [T-ETIT-109285]

**Responsible:** Dr.-Ing. Mathias Kluwe  
**Organisation:** KIT Department of Electrical Engineering and Information Technology  
**Part of:** M-ETIT-101156 - Control Engineering

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**Prerequisites**  
none
8.43 Course: Computational Macroeconomics [T-WIWI-112723]

**Responsible:** Prof. Dr. Johannes Brumm

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-106472 - Advanced Macroeconomics

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<td>Each summer term</td>
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**Competence Certificate**

The assessment takes place in the form of a written 60 min. examination during the lecture-free period of the semester. The examination is offered every semester and can be repeated at any regular examination date.

**Prerequisites**

None
8.44 Course: Constitution and Properties of Wear resistant materials [T-MACH-102141]

**Responsible:** Prof. Sven Ulrich  
**Organisation:** KIT Department of Mechanical Engineering  
**Part of:** M-MACH-101262 - Emphasis Materials Science

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**Exams**

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**Competence Certificate**  
oral examination (about 30 min)

no tools or reference materials

**Prerequisites**  
none

*Below you will find excerpts from events related to this course:*

**Constitution and Properties of Wear resistant materials**  
2194643, SS 2023, 2 SWS, Language: German, [Open in study portal](#)
Content
The assessment consists of an oral exam (ca. 30 min) taking place at the agreed date (according to Section 4(2), 2 of the examination regulation). The re-examination is offered upon agreement.

Teaching Content:
introduction
materials and wear
unalloyed and alloyed tool steels
high speed steels
stellites and hard alloys
hard materials
hard metals
ceramic tool materials
superhard materials
new developments
regular attendance: 22 hours
self-study: 98 hours

Basic understanding of constitution of wear-resistant materials, of the relations between constitution, properties and performance, of principles of increasing of hardness and toughness of materials as well as of the characteristics of the various groups of wear-resistant materials.

Recommendations: none

Organizational issues
Die Blockveranstaltung findet in folgendem Zeitraum statt:
17.04.-19.04.2023: jeweils von 8:00-16:00 Uhr;
Ort: KIT-CN, Geb. 681, Raum 214
Anmeldung verbindlich bis zum 13.04.2023 unter sven.ulrich@kit.edu.
Nach der Anmeldung wird Ihnen im Falle einer Online-Veranstaltung der Link zur Vorlesung per E-Mail am 14.04.2023 mitgeteilt.

Literature
Schneider, J.: Schneidkeramik, Verlag moderne Industrie, Landsberg am Lech, 1995

Kopien der Abbildungen und Tabellen werden verteilt; Copies with figures and tables will be distributed
### 8.45 Course: Construction Technology [T-BGU-101691]

**Responsible:** Prof. Dr.-Ing. Shervin Haghsheno  
**Organisation:** KIT Department of Civil Engineering, Geo and Environmental Sciences  
**Part of:** M-BGU-101004 - Fundamentals of Construction

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#### Events

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<th>Lecture / 🧩</th>
<th>Gentes, Haghsheno, Schneider</th>
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<td>6200411</td>
<td>Exercises to Construction Technology</td>
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#### Exams

| ST 2023 | 8230101691 | Construction Technology | Haghsheno |

**Legend:** 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✗ Cancelled

**Competence Certificate**  
written exam with 90 minutes

**Prerequisites**  
None

**Recommendation**  
None

**Annotation**  
None
8.46 Course: Consumer Behavior [T-WIWI-106569]

**Responsible:** Prof. Dr. Benjamin Scheibehenne  
**Organisation:** KIT Department of Economics and Management  
**Part of:**  
- M-WIWI-101424 - Foundations of Marketing  
- M-WIWI-105981 - Information Systems & Digital Business

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**Exams**

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**Competence Certificate**
The assessment of success takes the form of a presentation (weighting 20%) as part of the exercise and a written examination (90 minutes, weighting 80%).

**Prerequisites**
None.

**Annotation**
For further information, please contact the research group Marketing and Sales (http://marketing.iism.kit.edu/).

Below you will find excerpts from events related to this course:

**V Consumer Behavior**

2572174, SS 2023, 3 SWS, Language: English, Open in study portal
Content

Important information

1. WIWI portal registration is required for the course. The registration will be open in March. Seats are limited to 30;

2. Übung associated with this course is MANDATORY: Students will be asked to do presentations in groups of 3 (introduce and discuss academic papers assigned by the lecturer). This will take place over one day (as a blocked event) during the semester (When and where will be decided at the beginning of the semester). This task will count towards 20% of the final grades of the “Consumer Behavior” class. There will be no weekly or biweekly Übung besides this event.

Goal

The goal of the class is to gain a better understanding of the situational, biological, cognitive, and evolutionary factors that drive consumer behavior. We will address these questions from an interdisciplinary perspective, including relevant theories and empirical research findings from Psychology, Marketing, Cognitive Science, Biology, and Economics.

Description

Consumer decisions are ubiquitous in daily life and they can have long-ranging and important consequences for individual (financial) well-being and health but also for societies and the planet as a whole. To help people making better choices it is important to understand the factors that influence their behavior. Towards this goal, we will explore how consumer behavior is shaped by social influences, situational and cognitive constraints, as well as by emotions, motivations, evolutionary forces, neuronal processes, and individual differences. Across all topics covered in class, we will engage with basic theoretical work as well as with groundbreaking empirical research and current scientific debates. 
The lecture will be held in English.

Grading

Grading is based on two parts. An oral presentation that takes place in the Übung will count towards 20% of the grade. A written exam at the last day of class will make the rest 80%. The exam will cover the content of the lecture and the literature listed in the required reading list that will be made available to enrolled students on the first day of class. The exam questions will be in English. You are allowed to bring a language dictionary into the exam but you are not allowed to bring notes.

Workload

The total workload for this course is approximately 135 hours.

Presence time: 30 hours
Preparation and wrap-up of the course: 45 hours
Exam and exam preparation: 60 hours

Comment

This lecture features a “double down” format: There will be two lecture sessions in a row during the first half of the semester. Thus, you will be finished with this class after 7 weeks.

Literature

Will be made available to enrolled students on the first day of class.
8.47 Course: Control of Mobile Machines [T-MACH-111821]

**Responsible:** Simon Becker  
Prof. Dr.-Ing. Marcus Geimer

**Organisation:** KIT Department of Mechanical Engineering

**Part of:**  
M-MACH-101266 - Automotive Engineering  
M-MACH-101267 - Mobile Machines

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<td>Becker, Geimer</td>
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**Competence Certificate**  
The assessment consists of an oral exam (20 min) taking place in the recess period. The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

**Prerequisites**  
A prerequisite for participation in the examination is the preparation of a semester report. The preexamination with the code T-MACH-111820 must be passed.
8.48 Course: Control of Mobile Machines – Prerequisites [T-MACH-111820]

**Responsible:** Simon Becker  
Prof. Dr.-Ing. Marcus Geimer

**Organisation:** KIT Department of Mechanical Engineering

**Part of:**  
M-MACH-101266 - Automotive Engineering  
M-MACH-101267 - Mobile Machines

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**Exams**

| ST 2023 | 76-T-MACH-111820 | Control of mobile machines - Advance | Becker, Geimer |

**Competence Certificate**

Preparation of a report on the completion of the semester task

**Prerequisites**

none
8.49 Course: Control Technology [T-MACH-105185]

Responsible: Hon.-Prof. Dr. Christoph Gönnheimer
Organisation: KIT Department of Mechanical Engineering
Part of: M-MACH-106590 - Production Engineering

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Events

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Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✗ Canceled

Competence Certificate
Written Exam (60 min)

Prerequisites
none

Below you will find excerpts from events related to this course:

Control Technology
2150683, SS 2023, 2 SWS, Language: German, Open in study portal

Lecture (V)
On-Site
Content
The lecture control technology gives an integral overview of available control components within the field of industrial production systems.

The first part of the lecture deals with the fundamentals of signal processing and with control peripherals in the form of sensors and actors which are used in production systems for the detection and manipulation of process states.

The second part handles with the function of electric control systems in the production environment. The main focus in this chapter is laid on programmable logic controls, computerized numerical controls and robot controls. Finally the course ends with the topic of cross-linking and decentralization with the help of bus systems.

The lecture is very practice-oriented and illustrated with numerous examples from different branches.

The following topics will be covered:

• Signal processing
• Control peripherals
• Programmable logic controls
• Numerical controls
• Controls for industrial robots
• Distributed control systems
• Field bus
• Trends in the area of control technology

Learning Outcomes:
The students...

• are able to name the electrical controls which occur in the industrial environment and explain their function.
• can explain fundamental methods of signal processing. This involves in particular several coding methods, error protection methods and analog to digital conversion.
• are able to choose and to dimension control components, including sensors and actors, for an industrial application, particularly in the field of plant engineering and machine tools. Thereby, they can consider both, technical and economical issues.
• can describe the approach for projecting and writing software programs for a programmable logic control named Simatic S7 from Siemens. Thereby they can name several programming languages of the IEC 1131.

Workload:
regular attendance: 21 hours
self-study: 99 hours

Organizational issues
Zur Vertiefung des im Rahmen der Lehrveranstaltung erworbenen Wissens werden die theoretischen Vorlesungseinheiten durch Praxiseinheiten im Umfeld der Karlsruher Forschungsfabrik (https://www.karlsruher-forschungsfabrik.de) unterstützt.

The theoretical lectures are complemented by practical lectures in the Karlsruhe Research Factory (https://www.karlsruher-forschungsfabrik.de/en.html) to deepen the acquired knowledge.

Literature
Medien:
Skrift zur Veranstaltung wird über ilias (https://ilias.studium.kit.edu/) bereitgestellt.

Media:
Lecture notes will be provided in ilias (https://ilias.studium.kit.edu/).
8 COURSES

Course: Conveying Technology and Logistics [T-MACH-102135]

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**Responsible:** Prof. Dr.-Ing. Kai Furmans
Paolo Pagani

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-WIWI-101816 - Seminar Module

**Events**

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**Exams**

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Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✗ Canceled

**Competence Certificate**

alternative test achievement (graded):

- written elaboration (workload of at least 80 h)
- oral presentation (approx. 30 min)

**Prerequisites**

none

Below you will find excerpts from events related to this course:

**Fördertechnik und Logistiksysteme**

2119100, SS 2023, SWS, Language: German/English, Open in study portal

**Organizational issues**

Ort: Gebäude 50.38, Raum 0.22, Termine siehe homepage

**Content**

The goal of the seminar is to deal with different topics related to the materials handling and logistics. Depending on the topic, the students can work on the either alone or in a group. At the end the results are presented and discussed with a final presentation. To prepare the work for the seminar an introductory event is scheduled at the beginning.

**Fördertechnik und Logistiksysteme**

2119100, WS 23/24, SWS, Language: German/English, Open in study portal

**Organizational issues**

Weiteres siehe Homepage
### 8.51 Course: Data-Driven Algorithms in Vehicle Technology [T-MACH-112126]

**Responsible:** Dr. Stefan Scheubner  
**Organisation:** KIT Department of Mechanical Engineering  
**Part of:**  
- M-MACH-101265 - Vehicle Development  
- M-MACH-101266 - Automotive Engineering

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**Exams**

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Legend: $\mathbb{C}$ Online, $\mathbb{C}$ Blended (On-Site/Online), $\mathbb{C}$ On-Site, $\times$ Cancelled

**Competence Certificate**

Written Examination

**Duration:** 90 minutes

*Below you will find excerpts from events related to this course:*

**Data-Driven Algorithms in Vehicle Technology**  
2113840, WS 23/24, 2 SWS, Language: English, Open in study portal

**Content**

Course Syllabus: Data-Driven Algorithms in Vehicle Technology

Motivation for the Course: Nowadays, engineers often develop technical systems using a combination of hard- and software. This is true especially for modern passenger vehicle development. In a digitalized world, such developments are built on knowledge gained from relevant data sources, e.g. the vehicle sensors. Therefore, engineers in automobile technology need qualifications from data science to successfully create new functionalities in the cars. To prevent remaining purely theoretical, the algorithms in this course are explained using a real-world problem of “EV Routing”. Students have the opportunity to test methods in Python with frequent exercises presented.

Goal of the Course: Students have a basic understanding of data-driven algorithms such as Markov Models, Machine Learning or Monte-Carlo Methods. The approach for building data-driven models in automobile technology are known to students and they are able to test algorithms in the programming language “Python”. Furthermore, students have learnt how to analyse the algorithm performance.

Content:

1. Introduction to function development as well as the prerequisites for the course (e.g. Fundamentals for running Python code)
2. Fundamentals for EV Routing and relevant data sources
3. Parameter estimation and state classification algorithms to determine the current situation of the vehicle
4. Learning methods for driver behaviour
5. Forecast algorithms to predict future energy consumption of an electric vehicle

**Organizational issues**

Das Vorlesungsmaterial wird auf ILIAS bereitgestellt. Das ILIAS-Passwort erhalten Sie unter [https://fast-web-01.fast.kit.edu/PasswoerterIlias/](https://fast-web-01.fast.kit.edu/PasswoerterIlias/)

Campus Ost, Geb. 70.04, Raum 219. Studierende müssen einen eigenen Laptop mitbringen.
### Course: Decision Theory [T-WIWI-102792]

**Responsible:** Prof. Dr. Karl-Martin Ehrhart  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101499 - Applied Microeconomics

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**Competence Certificate**
The assessment of this course is a written examination (following §4(2), 1 SPO) of 60 mins.  
The exam is offered each semester.

**Prerequisites**
None

**Recommendation**
Knowledge in mathematics and statistics is required.
8.53 Course: Derivatives [T-WIWI-102643]

**Responsible:** Prof. Dr. Marliese Uhrig-Homburg

**Organisation:** KIT Department of Economics and Management

**Part of:**
- M-WIWI-101402 - eFinance
- M-WIWI-101423 - Topics in Finance II
- M-WIWI-101465 - Topics in Finance I

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**Competence Certificate**

Depending on further pandemic developments, the examination will be offered either as a 60-minute written examination or as an open-book examination (alternative exam assessment).

A bonus can be earned by correctly solving at least 50% of the posed bonus exercises. If the grade of the written examination is between 4.0 and 1.3, the bonus improves the grade by up to one grade level (0.3 or 0.4). Details will be announced in the lecture.

**Prerequisites**

None

**Recommendation**

None

*Below you will find excerpts from events related to this course:*

**Derivatives**

2530550, SS 2023, 2 SWS, Language: German, [Open in study portal](#)

**Literature**


**Weiterführende Literatur:**

8.54 Course: Design and Development of Mobile Machines [T-MACH-105311]

**Responsible:** Prof. Dr.-Ing. Marcus Geimer
Jan Siebert

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101267 - Mobile Machines

---

### Type
Oral examination

### Credits
4

### Grading scale
Grade to a third

### Recurrence
Each winter term

### Version
1

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### Events

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### Exams

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### Competence Certificate

The assessment consists of an oral exam (20 min) taking place in the recess period. The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

A registration is mandatory, the details will be announced on the webpages of the Institute of Vehicle System Technology / Institute of Mobile Machines. In case of too many applications, attendance will be granted based on pre-qualification.

The course will be replenished by interesting lectures of professionals from leading hydraulic companies.

### Prerequisites

Required for the participation in the examination is the preparation of a report during the semester. The partial service with the code T-MACH-108887 must have been passed.

### Recommendation

Knowledge in Fluid Power Systems (LV 2114093)

### Annotation

After completion of the lecture, students can:

- design working and travel drive train hydraulics of mobile machines and can derive characteristic key factors.
- choose and apply suitable state of the art designing methods successfully
- analyse a mobile machine and break its structure down from a complex system to subsystems with reduced complexity
- identify and describe interactions and links between subsystems of a mobile machine
- present and document solutions of a technical problem according to R&D standards

The number of participants is limited.

### Content:

The working scenario of a mobile machine depends strongly on the machine itself. Highly specialised machines, e.g., pavers are also as common as universal machines with a wide range of applications, e.g., hydraulic excavators. In general, all mobile machines are required to do their intended work in an optimal way and satisfy various criteria at the same time. This makes designing mobile machines to a great and interesting challenge. Nevertheless, usually key factors can be derived for every mobile machine, which affect all other machine parameters. During this lecture, these key factors and designing mobile machines accordingly will be addressed. To do so, an exemplary mobile machine will be discussed and designed in the lecture as a semester project.

### Literature:

See german recommendations

---

*Below you will find excerpts from events related to this course:*
Design and Development of Mobile Machines
2113079, WS 23/24, 2 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Content
Wheel loaders and excavators are highly specialized mobile machines. Their function is to detach, pick up and deposit materials near by. Significant size for dimensioning of the machines is the content of their standard shovel. In this lecture the main steps in dimensioning a wheel loader or excavator are being thought. This includes among others:

- Defining the size and dimensions,
- the dimensioning of the electric drive train,
- the dimensioning of the primary energy supply,
- Determining the kinematics of the equipment,
- the dimension of the working hydraulics and
- Calculations of strength

The entire design process of these machines is strongly influenced by the use of standards and guidelines (ISO/DIN-EN). Even this aspect is dealt with.

The lecture is based on the knowledge from the fields of mechanics, strength of materials, machine elements, propulsion and fluid technique. The lecture requires active participation and continued collaboration.

Recommendations:
Knowledge in Fluid Technology (SoSe, LV 21093)

- regular attendance: 21 hours
- self-study: 99 hours

Literature
Keine.
8.55 Course: Design and Development of Mobile Machines - Advance [T-MACH-108887]

**Responsible:** Prof. Dr.-Ing. Marcus Geimer
Jan Siebert

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101267 - Mobile Machines

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**Competence Certificate**
Preparation of semester report

**Prerequisites**
none
### 8.56 Course: Design and Operation of Power Transformers [T-ETIT-101925]

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**Responsible:** Prof. Dr.-Ing. Thomas Leibfried  
Michael Schäfer

**Organisation:** KIT Department of Electrical Engineering and Information Technology

**Part of:** M-ETIT-101165 - Energy Generation and Network Components
Course: Development Methods of Technical Systems [T-MACH-111283]

**Responsible:** Dipl.-Ing. Thomas Maier  
Prof. Dr.-Ing. Jivka Ovtcharova

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101270 - Product Lifecycle Management

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**Competence Certificate**
Graded examination of other type weighted 50% project documentation and 50% colloquium.

**Prerequisites**
None

**Recommendation**
None

Below you will find excerpts from events related to this course:

**Development methods of technical systems**

2121002, SS 2023, 4 SWS, Language: German/English, Open in study portal

**Project (PRO)**
On-Site

Content
Requirements, SysML, Modelica, FEM high performance computing, process modeling, VR/AR

Students can exemplarily:

- Collect requirements for large technical systems (e.g.: Helmholtz large-scale device KATRIN).
- Describe physical systems across domains with the modeling language Modelica and simulate the systems behavior.
- Generate simple FE meshes for simulations of structural mechanics.
- Perform general FEM analyses on mainframe computers and prepare and explain simulation results.
- As a team present the learned skills and document them continuously.

**Development methods of technical systems**

2121002, WS 23/24, 4 SWS, Language: German/English, Open in study portal

**Project (PRO)**
On-Site

Content
Requirements, SysML, Modelica, FEM high performance computing, process modeling, VR/AR

Students can exemplarily:

- Collect requirements for large technical systems (e.g.: Helmholtz large-scale device KATRIN).
- Describe physical systems across domains with the modeling language Modelica and simulate the systems behavior.
- Generate simple FE meshes for simulations of structural mechanics.
- Perform general FEM analyses on mainframe computers and prepare and explain simulation results.
- As a team present the learned skills and document them continuously.
**8.58 Course: Development of Hybrid Drivetrains [T-MACH-110817]**

**Responsible:** Prof. Dr. Thomas Koch  
**Organisation:** KIT Department of Mechanical Engineering  
**Part of:** M-MACH-101303 - Combustion Engines II

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**Competence Certificate**  
written exam, 1 hour

**Prerequisites**  
None

Below you will find excerpts from events related to this course:

**Development of Hybrid Powertrains**  
2134155, SS 2023, 2 SWS, Language: German, [Open in study portal](#)

**Content**

1. Introduction and Goal  
2. Alternative Powertrains  
3. Fundamentals of Hybrid Powertrains  
4. Fundamentals of Electric Components of Hybrid Powertrains  
5. Interactions in Hybrid Powertrain Development  
6. Overall System Optimization
Course: Digital Democracy [T-WWI-113160]

Type: Examination of another type
Credits: 4.5
Grading scale: Grade to a third
Recurrence: Each winter term
Expansion: 1 terms
Version: 1

Events

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Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✗ Cancelled

Competence Certificate
Alternative exam assessment. The examination consists of two parts (presentation and oral exam). Details on the design of the exam will be announced at the beginning of the course.

Annotation
Limited to 25 students. Application (cover letter) via the Wiwi-portal.

Below you will find excerpts from events related to this course:

Digital Democracy
00052, WS 23/24, 2 SWS, Language: English, Open in study portal
Lecture (V)
Blended (On-Site/Online)

Content
The "Digital Democracy" Lecture deals with opportunities and challenges of democracy and participation in a digitalized world. Social networks and other platforms have become a central place for human interaction.

These technologies open up many possibilities to connect people, promote societal discourse, and organize social movements. On the other hand, they are also used to undermine democracy by extremist forces.

One example is the spread of disinformation through social media, which can undermine trust in democratic institutions and exacerbate divisions in society. Big tech actors pursue their own economically driven interests, some of which run counter to societal ones.

So to what extent can Internet platforms help strengthen social discourse? And what measures can be taken to promote the quality and diversity of discourse in the digital world? What role do big tech players play in digital democracy and how can their interests be reconciled with democratic principles? These and many more questions will be explored in the lecture. The lecture introduces theoretical foundations and evidence-based research on digital democracy. It will address the following questions: What characterizes deliberative democracies, how do democracies change, and what can damage them? How does social polarization emerge and what drives it - off- and online. Accordingly, different platform types and phenomena of disinformation, such as clickbait, will be presented. The last part of the lecture series will deal with the search for approaches and alternatives to these problems.

Organizational issues
Beschränkung auf 25 Plätze mit Bewerbung per kurzem Motivationschreiben (ab Anfang/Mitte September über das Wiki-Portal)
**Course: Digital Markets and Market Design [T-WIWI-112228]**

**Responsible:** Prof. Dr. Adrian Hillenbrand

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-101499 - Applied Microeconomics

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Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ❌ Cancelled

**Competence Certificate**

The assessment consists of a written exam (60 minutes). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

**Prerequisites**

None

**Annotation**

The lecture will be held in English.

---

Below you will find excerpts from events related to this course:

**Digital Markets and Market Design**

2500035, WS 23/24, 2 SWS, Language: English, Open in study portal

**Content**

Online Markets determine our everyday lives. At the same time rapid technological advancements quickly change the landscape of online markets posing challenges for market design and consumer protection. In this course we apply theoretical economic models in the area of digital markets in order to make sense of current developments. Topics include consumer search, algorithmic pricing, recommender systems and steering, price discrimination and matching markets. We also discuss the potential effects of current policies like the Digital Markets Act and Digital Services Act on market outcomes.

**Digital Markets and Market Design**

2500036, WS 23/24, 1 SWS, Language: English, Open in study portal

**Content**

Exercise Session for the course *Digital Markets and Market Design*

**Organizational issues**

Jede zweite Woche eine Übung
### Competence Certificate

The assessment consists of a written exam (60 min) (§4(2), 1 of the examination regulations). By successful completion of the exercises (§4(2), 3 SPO 2007 respectively §4(3) SPO 2015) a bonus can be obtained. If the grade of the written exam is at least 4.0 and at most 1.3, the bonus will improve it by one grade level (i.e. by 0.3 or 0.4).

### Prerequisites

see below

### Annotation

This course replaces T-WIWI-105771 “Foundations of Digital Services A” as of winter semester 2019/2020. Students who wish to register for the examination in the summer semester 2019 please select the examination “Foundations of Digital Services A”.

### Below you will find excerpts from events related to this course:

**Digital Services: Foundations**

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<td>Lecture / 📝</td>
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**Exams**

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**Content**

The world has been moving towards “service-led” economies: In many developed countries, services already account for more than 70% of the gross domestic product. In order to design, engineer, and manage services, traditional “goods-oriented” business models are often inappropriate. At the same time, the rapid development of information and communication technology (ICT) pushes “servitization” and the economic importance of digital services and, therefore, drives competition: Increased interaction and individualization options open up new dimensions of “value co-creation” between providers and customers; dynamic and scalable service value networks replace static value chains; services can instantly be delivered anywhere across the globe.

Building on a systematic categorization of different types of services and on the general notion of “value co-creation”, we cover concepts and foundations for engineering and managing ICT-based digital services, allowing for further specialization in other KSRI/IISM courses at the Master level. Topics in this course include an introduction to services, cloud and cloud labor services, web services, service innovation, service analytics, digital economics, as well as the transformation and coordination of service value networks. Additionally, case studies, hands-on exercises, and guest lectures will illustrate the relevance of digital services in today’s world. This course is held in English to acquaint students with international environments.
Literature

Below you will find excerpts from events related to this course:

**Digital Services: Foundations**

2595466, SS 2023, 2 SWS, Language: English, [Open in study portal](#)

Lecture (V)

Blended (On-Site/Online)

**Content**

The world has been moving towards "service-led" economies: In many developed countries, services already account for more than 70% of the gross domestic product. In order to design, engineer, and manage services, traditional "goods-oriented" business models are often inappropriate. At the same time, the rapid development of information and communication technology (ICT) pushes "servitization" and the economic importance of digital services and, therefore, drives competition: Increased interaction and individualization options open up new dimensions of "value co-creation" between providers and customers; dynamic and scalable service value networks replace static value chains; services can instantly be delivered anywhere across the globe.

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Literature

# 8.63 Course: Digitalization from Production to the Customer in the Optical Industry [T-MACH-110176]

**Responsible:** Dr.-Ing. Marc Wawerla  
**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-106590 - Production Engineering

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## Exams

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**Legend:** 🖥 Online, 📦 Blended (On-Site/Online), On-Site, 🗙 Cancelled

## Competence Certificate

Alternative test achievement (graded):
- Written processing of a case study (weighting 50%) and
- Presentation of the results (ca. 10 min.) followed by a colloquium (ca. 30 min.), (weighting 50%)

## Prerequisites

none

## Annotation

For organisational reasons, the number of participants for the course is limited. As a result, a selection process will take place. Further information for application can be found via: [https://www.wbk.kit.edu/english/education.php](https://www.wbk.kit.edu/english/education.php).

Below you will find excerpts from events related to this course:

**Digitalization from Production to the Customer in the Optical Industry**  
2149701, WS 23/24, 2 SWS, Language: English, Open in study portal  
Lecture (V)  
On-Site
Content
The lecture deals with Digitalization along the entire value chain end-to-end, with a focus on production and supply chain. Within this context, concepts, tools, methods, technologies and concrete applications in the industry are presented. Furthermore, the students get the opportunity to get first-hand insights into the digitalization journey of a German technology company.

Main topics of the lecture:
- Concepts and methods such as disruptive innovation and agile project management
- Overview on technologies at disposal
- Practical approaches in innovation
- Applications in industry
- Field trip to ZEISS

Learning Outcomes:
The students ...
- are capable to comment on the content covered by the lecture.
- are able to analyze and evaluate the suitability of digitalization technologies in the optical industry.
- are able to assess the applicability of methods such as disruptive innovation and agile project management.
- are able to appreciate the practical challenges to digitalization in industry.

Workload:
regular attendance: 21 hours
self-study: 99 hours

Organizational issues

For organisational reasons, the number of participants for the course is limited. As a result, a selection process will take place. Further information for application can be found via:
8 COURSES

Course: Drive Train of Mobile Machines [T-MACH-105307]

8.64 Course: Drive Train of Mobile Machines [T-MACH-105307]

Responsible: Prof. Dr.-Ing. Marcus Geimer
Marco Wydra

Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101267 - Mobile Machines

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Competence Certificate

The final assessment will be an oral examination (20 min) taking place during the recess period. The examination will be offered in every semester and can be repeated at any regular examination date.

Prerequisites

none

Recommendation

- General principles of mechanics engineering
- Basic knowledge of hydraulics
- Interest in mobile machinery

Annotation

At the end of the lecture, participants can explain the structure and function of all discussed drive trains of mobile machines. They can analyze complex gearbox schematics and synthesize simple transmission functions using rough calculations.

Content:

In this course the different drive trains of mobile machinery will be discussed. The focus of this course is:

- mechanical gears
- torque converter
- hydrostatic drives
- power split drives
- electrical drives
- hybrid drives
- axles
- terra mechanics

Media: projector presentation

Literature: Download of lecture slides from ILIAS. Further literature recommendations during lectures.

Below you will find excerpts from events related to this course:

Drive Train of Mobile Machines

2113077, WS 23/24, 2 SWS, Language: German, Open in study portal

Lecture (V) On-Site
Content
In this course will be discussed the different drive train of mobile machineries. The fokus of this course is:
- improve knowledge of fundamentals
- mechanical gears
- torque converter
- hydrostatic drives
- continuous variable transmission
- electrical drives
- hybrid drives
- axles
- terra mechanic

Recommendations:
- general basics of mechanical engineering
- basic knowledge in hydraulics
- interest in mobile machines
- regular attendance: 21 hours
- self-study: 89 hours

Literature
Skriptum zur Vorlesung downloadbar über ILIAS
8.65 Course: Economics and Behavior [T-WIWI-102892]

**Responsible:** Prof. Dr. Nora Szech  
**Organisation:** KIT Department of Economics and Management  
**Part of:**  
- M-WIWI-101499 - Applied Microeconomics  
- M-WIWI-101501 - Economic Theory

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**Exams**

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**Competence Certificate**

The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

**Prerequisites**

None

**Recommendation**

Basic knowledge of microeconomics and statistics are recommended. A background in game theory is helpful, but not absolutely necessary.

**Annotation**

The lecture will be held in English.

Below you will find excerpts from events related to this course:

**Economics and Behavior**

2560137, WS 23/24, 2 SWS, Language: English, Open in study portal

**Lecture (V)**

Blended (On-Site/Online)

**Content**

The course covers topics from behavioral economics with regard to contents and methods. In addition, the students gain insight into the design of economic experiments. Furthermore, the students will become acquainted with reading and critically evaluating current research papers in the field of behavioral economics.

The students

- gain insight into fundamental topics in behavioral economics;
- get to know different research methods in the field of behavioral economics;
- learn to critically evaluate experimental designs;
- get introduced to current research papers in behavioral economics;
- become acquainted with the technical terminology in English.

The assessment consists of a written exam (60 minutes) (following §4(2), 1 of the examination regulation).

The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

The grade will be determined in a final written exam. Students can earn a bonus to the final grade by successfully participating in the exercises.

The total workload for this course is approximately 135.0 hours. For further information see German version.

The lecture will be held in English.

**Recommendations:**

Basic knowledge of microeconomics and statistics are recommended. A background in game theory is helpful, but not absolutely necessary.
Literature
### Course: Economics I: Microeconomics [T-WIWI-102708]

**Responsibility:**
Prof. Dr. Clemens Puppe  
Prof. Dr. Johannes Philipp Reiß

**Organisation:**
KIT Department of Economics and Management

**Part of:**
- M-WIWI-100950 - Preliminary Exam
- M-WIWI-101398 - Introduction to Economics

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| Lecture    | Lecture /  | 2610012     | 2610012 | 3 SWS   | Puppe, Ammann
|            | Puppe, Ammann |
| Tutorial   | Tutorial /  | 2610013 |      |         | Ammann, Puppe |
| Exam       |            | 7900255     | 7900259 |         | Puppe |

**Exams**

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<td>Economics I: Microeconomics</td>
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**Competence Certificate**
The assessment consists of a written exam (120 min) following §4, Abs. 2, 1 of the examination regulation. The main exam takes place subsequent to the lecture. The re-examination is offered at the same examination period. As a rule, only repeating candidates are entitled for taking place the re-examination. For a detailed description on the exam regulations see the information of the respective chair.

**Prerequisites**
None

Below you will find excerpts from events related to this course:

#### Lectures

**Economics I: Microeconomics**

- Code: 2610012, WS 23/24, 3 SWS, Language: German, Open in study portal
- Type: Lecture (V)
- On-Site
Content
The students learn the basic concepts in Microeconomics and some basics in game theory. The student will understand the working of markets in modern economies and the role of decision making. Furthermore, she should be able to understand simple game theoretic argumentation in different fields of Economics.

In the two main parts of the course problems of microeconomic decision making (household behavior, firm behavior) and problems of commodity allocation on markets (market equilibria and efficiency of markets) as well are discussed. In the final part of the course basics of imperfect competition (oligopolistic markets) and of game theory are presented.

It is the main aim of this course to provide basic knowledge in economic modelling. In particular, the student should be able to analyze market processes and the determinants of market results. Furthermore, she should be able to evaluate the effects of economic policy measures on market behavior and propose alternative, more effective policy measures.

In particular, the student should learn

- to apply simple microeconomic concepts,
- to analyze the structure of real world economic phenomena,
- to judge the possible effects of economic policy measures on the behavior of economic agents (in simple decision problems),
- to suggest alternative policy measures,
- to analyze as a participant of a tutorial simple economic problems by solving written exercises and to present the results of the exercises on the blackboard,
- to become familiar with the basic literature on microeconomics.

The student should gain basic knowledge in order to help in practical problems

- to analyze the structure of microeconomics relationships and to present own problem solutions,
- solve simple economic decision problems.

The assessment consists of a written exam (120 min) following §4, Abs. 2, 1 of the examination regulation. The main exam takes place subsequent to the lecture.

The re-examination is offered at the same examination period. Usually, only repeating candidates are entitled for taking place the re-examination. For a detailed description on the exam regulations see the information of the respective chair.

The total workload for this course is approximately 150 hours.

Literature

- H. Varian, Grundzüge der Mikroökonomik, 5. Auflage (2001), Oldenburg Verlag
- Pindyck, Robert S./Rubinfeld, Daniel L., Mikroökonomie, 6. Aufl., Pearson. Münnschen, 2005
8.67 Course: Economics II: Macroeconomics [T-WIWI-102709]

**Responsible:** Prof. Dr. Berthold Wigger  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101398 - Introduction to Economics

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**Competence Certificate**
Depending on further pandemic developments, the examination will be offered either as a 120-minute written examination (written examination according to SPO § 4 Abs. 2, Pkt. 1) or as an open-book examination (alternative exam assessment according to SPO § 4 Abs. 2, Pkt. 3).

**Prerequisites**
None

*Below you will find excerpts from events related to this course:*

- **Economics II: Macroeconomics**  
  2600014, SS 2023, 4 SWS, Language: German, Open in study portal  
  Lecture (V)
Content
Classical Theory of Macroeconomic Production
Chapter 1: Gross domestic product
Chapter 2: Money and Inflation
Chapter 3: Open Economy I
Chapter 4: Unemployment

Growth: The economy in the long term
Chapter 5: Growth I
Chapter 6: Growth II

Business cycle: The economy in the short term
Chapter 7: Economy and aggregate demand I
Chapter 8: Economy and aggregate demand II
Chapter 9: Open Economy II
Chapter 10: Macroeconomic supply

Advanced topics of macroeconomics
Chapter 11: Dynamic model of the economy as a whole
Chapter 12: Microeconomic foundations
Chapter 13: Macroeconomic economic policy

Learning goals:
The students...
- can name the basic indicators, technical terms and concepts of macroeconomics.
- can use models to reduce complex relationships to their basic components.
- can analyse economic policy debates and form their own opinion on them.

Workload:
Total effort for 5 credit points: approx. 150 hours
Presence time: 45 hours
Before and after the LV: 67.5 hours
Exam and exam preparation: 37.5 hours

Literature
Als Grundlage dieser Veranstaltung dient das bekannte Lehrbuch „Makroökonomik“ von Greg Mankiw vom Schäffer Poeschel Verlag in der aktuellen Fassung.
Course: Economics III: Introduction in Econometrics [T-WIWI-102736]

- **Responsible:** Prof. Dr. Melanie Schienle
- **Organisation:** KIT Department of Economics and Management
- **Part of:**
  - M-WIWI-101499 - Applied Microeconomics
  - M-WIWI-101599 - Statistics and Econometrics

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Exams

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<th>Recurrence</th>
<th>Version</th>
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<td>ST 2023 7900044 Economics III: Introduction in Econometrics</td>
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<td>Schienle</td>
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<td>WT 23/24 7900002 Economics III: Introduction in Econometrics</td>
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</table>

**Competence Certificate**

Depending on further pandemic developments, the examination will be offered either as a 90-minute written examination (written examination according to SPO § 4 Abs. 2, Pkt. 1) or as an open-book examination (alternative exam assessment according to SPO § 4 Abs. 2, Pkt. 3).

**Prerequisites**

None

Below you will find excerpts from events related to this course:

**Economics III: Introduction to Econometrics**

*Language: German,
Open in study portal*

**Lecture (V)**

**On-Site**

**Content**

**Learning objectives:**

- Familiarity with the basic concepts and methods of econometrics
- Preparation of simple econometric surveys

**Content:**

- Simple and multiple linear regression (estimating parameters, confidence interval, testing, prognosis, testing assumptions)
- Model assessment

**Requirements:**

Knowledge of the lectures Statistics I + II is required.

**Workload:**

- Total workload for 5 CP: approx. 150 hours
- Attendance: 30 hours
- Preparation and follow-up: 120 hours

**Literature**

- Schneeweiß: Ökonometrie ISBN 3-7908-0008-2
8.69 Course: eFinance: Information Systems for Securities Trading [T-WIWI-110797]

**Responsible:** Prof. Dr. Christof Weinhardt

**Organisation:** KIT Department of Economics and Management

**Part of:**
- M-WIWI-101402 - eFinance
- M-WIWI-101423 - Topics in Finance II
- M-WIWI-101434 - eBusiness and Service Management
- M-WIWI-101465 - Topics in Finance I
- M-WIWI-105981 - Information Systems & Digital Business

**Type**
- Written examination

**Credits**
- 4.5

**Grading scale**
- Grade to a third

**Recurrence**
- Each winter term

**Version**
- 1

**Events**

<table>
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<tr>
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<th>Grading scale</th>
<th>Recurrence</th>
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<td>Each winter term</td>
<td>1</td>
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</table>

**Legend:** ![Online](image), ![Blended](image), ![On-Site](image), ![Cancelled](image)

**Competence Certificate**

Success is monitored by means of ongoing elaborations and presentations of tasks and an examination (60 minutes) at the end of the lecture period. The scoring scheme for the overall evaluation will be announced at the beginning of the course.

**Modeled Conditions**

The following conditions have to be fulfilled:

1. The course **T-WIWI-102600 - eFinance: Information Engineering and Management for Securities Trading** must not have been started.

**Annotation**

The course "eFinance: Information Systems for Securities Trading" covers different actors and their function in the securities industry in-depth, highlighting key trends in modern financial markets, such as Distributed Ledger Technology, Sustainable Finance, and Artificial Intelligence. Security prices evolve through a large number of bilateral trades, performed by market participants that have specific, well-regulated and institutionalized roles. Market microstructure is the subfield of financial economics that studies the price formation process. This process is significantly impacted by regulation and driven by technological innovation. Using the lens of theoretical economic models, this course reviews insights concerning the strategic trading behaviour of individual market participants, and models are brought market data. Analytical tools and empirical methods of market microstructure help to understand many puzzling phenomena in securities markets.

Below you will find excerpts from events related to this course:

**eFinance: Information Systems for Securities Trading**

<table>
<thead>
<tr>
<th>Events</th>
<th>Type</th>
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<th>Grading scale</th>
<th>Recurrence</th>
<th>Version</th>
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<td>Lecture</td>
<td>2 SWS</td>
<td>Grade to a third</td>
<td>Each winter term</td>
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<tr>
<td>WT 23/24</td>
<td>Practice</td>
<td>1 SWS</td>
<td>Grade to a third</td>
<td>Each winter term</td>
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</table>

**Literature**


**Weiterführende Literatur:**

# 8.70 Course: Electric Energy Systems [T-ETIT-101923]

**Responsible:** Prof. Dr.-Ing. Thomas Leibfried  
**Organisation:** KIT Department of Electrical Engineering and Information Technology  
**Part of:** M-ETIT-102379 - Power Network

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<td>Leibfried</td>
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<td>ST 2023</td>
<td>1 SWS</td>
<td>Übungen zu 2307391 Elektroenergiesysteme</td>
<td>Steinle</td>
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<tbody>
<tr>
<td>ST 2023</td>
<td>Electric Energy Systems</td>
<td>Leibfried</td>
</tr>
</tbody>
</table>

**Prerequisites**
none

---

**Events Listings**

- **ST 2023 2307391**
  - Electric Energy Systems
  - 2 SWS
  - Lecture / On-Site
  - Leibfried

- **ST 2023 2307393**
  - Übungen zu 2307391 Elektroenergiesysteme
  - 1 SWS
  - Practice / On-Site
  - Steinle

**Exams Listings**

- **ST 2023 7307391**
  - Electric Energy Systems
  - Leibfried
### 8.71 Course: Electrical Engineering for Business Engineers, Part I [T-ETIT-100533]

**Responsible:** Dr. Wolfgang Menesklou  
**Organisation:** KIT Department of Electrical Engineering and Information Technology  
**Part of:** M-ETIT-101155 - Electrical Engineering

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#### Events

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<td>Electrical Engineering for Business Engineers, Part I</td>
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#### Exams

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<td>Electrical Engineering for Business Engineers, Part I</td>
<td>Menesklou</td>
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</table>

Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, 🚫 Cancelled
# 8 Course: Electrical Engineering for Business Engineers, Part II [T-ETIT-100534]

**Responsible:** Dr. Wolfgang Menesklou  
**Organisation:** KIT Department of Electrical Engineering and Information Technology  
**Part of:**  
- M-MACH-101261 - Emphasis in Fundamentals of Engineering  
- M-WIWI-101839 - Additional Fundamentals of Engineering

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## Events

| ST 2023 | 2304224 | Elektrotechnik II für Wirtschaftsingenieure | 3 SWS | Lecture / 🗣️ | Menesklou |

## Exams

| ST 2023 | 7304224 | Electrical Engineering for Business Engineers, Part II | Menesklou |
| WT 23/24 | 7304224 | Electrical Engineering for Business Engineers, Part II | Menesklou |

**Legend:** 🖥 Online, 🧩 Blended (On-Site/Online), 🗣️ On-Site, ✗ Cancelled
8.73 Course: Energy Policy [T-WIWI-102607]

**Responsible:** Prof. Dr. Martin Wietschel  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101464 - Energy Economics

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<td>2581959</td>
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**Exams**

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<td>Energy Policy</td>
<td>Fichtner</td>
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Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣️ On-Site, ✗ Cancelled

**Competence Certificate**

The assessment consists of a written exam (60 minutes) (following §4(2) of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date. Depending on the respective pandemic situation, the exam may be offered as an open book exam (alternative exam assessment, following §4(2), 3 of the examination regulation).

**Prerequisites**

None.

Below you will find excerpts from events related to this course:

**Energy Policy**

Energy Policy  
2581959, SS 2023, 2 SWS, Language: German, [Open in study portal]

**Content**

The availability of cheap, environmentally friendly and secure energy is crucial for human welfare. However, the increasing scarcity of resources and increasing environmental pressures, with a particular focus on climate change, threaten human welfare through economic action. Energy contributes significantly to environmental pollution. The energy industry is characterised by high regulation and a significant influence of political decisions.

At the beginning of the lecture different perspectives on energy policy will be presented and the analysis of political decision-making processes will be discussed. Then the current energy policy challenges in the area of environmental pollution, regulation and the role of energy for households and industry will be discussed. Then the actors of energy policy and energy responsibilities in Europe will be discussed. The economic approaches from traditional environmental economics and sustainability as a new policy approach will then be discussed. Finally, energy policy instruments such as the promotion of renewable energies or energy efficiency are discussed in detail and how they can be evaluated.

The lecture emphasizes the relationship between theory and practice and presents some case studies.

**Literature**

Wird in der Vorlesung bekannt gegeben.
8.74 Course: Engine Measurement Techniques [T-MACH-105169]

**Responsible:** Dr.-Ing. Sören Bernhardt

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101303 - Combustion Engines II

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**Exams**

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<td>Koch</td>
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**Legend:** 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ❌ Cancelled

**Competence Certificate**
oral examination, Duration: 0.5 hours, no auxiliary means

**Prerequisites**
none

**Recommendation**
T-MACH-102194 Combustion Engines I

Below you will find excerpts from events related to this course:

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<tbody>
<tr>
<td>2134137</td>
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**Literature**

1. Grohe, H.: Messen an Verbrennungsmotoren
2. Bosch: Handbuch Kraftfahrzeugtechnik
3. Veröffentlichungen von Firmen aus der Meßtechnik
4. Hoffmann, Handbuch der Meßtechnik
5. Klingenberg, Automobil-Meßtechnik, Band C
### 8.75 Course: Exam on Climatology [T-PHYS-105594]

**Responsible:** Prof. Dr. Joaquim José Ginete Werner Pinto  
**Organisation:** KIT Department of Physics  
**Part of:** M-WIWI-104838 - Introduction to Natural Hazards and Risk Analysis

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<td>Exam on Climatology as Minor Subject</td>
<td>Ginete Werner Pinto</td>
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<tr>
<td>ST 2023 7800139</td>
<td>Climatology reexam</td>
<td>Ginete Werner Pinto</td>
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</tbody>
</table>
Course: Facility Location and Strategic Supply Chain Management [T-WIWI-102704]

**Responsibility:** Prof. Dr. Stefan Nickel

**Organisation:** KIT Department of Economics and Management

**Part of:**
- M-WIWI-101413 - Applications of Operations Research
- M-WIWI-101414 - Methodical Foundations of OR
- M-WIWI-101421 - Supply Chain Management

**Type:** Written examination

**Credits:** 4.5

**Grading Scale:** Grade to a third

**Recurrence:** Each winter term

**Version:** 4

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**Events**

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<th>Code</th>
<th>Event Type</th>
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<tr>
<td>WT 23/24</td>
<td>2550486</td>
<td>Lecture</td>
<td>2 SWS</td>
<td>Facility Location and Strategic Supply Chain Management</td>
<td>Nickel</td>
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<tr>
<td>WT 23/24</td>
<td>2550487</td>
<td>Practice</td>
<td>1 SWS</td>
<td>Übungen zu Standortplanung und strategisches SCM</td>
<td>Hoffmann</td>
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**Exams**

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<td>Facility Location and Strategic Supply Chain Management</td>
<td>Nickel</td>
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**Competence Certificate**

The assessment consists of a written exam (60 min) according to Section 4 (2), 1 of the examination regulation. The exam takes place in every semester. Prerequisite for admission to examination is the successful completion of the online assessments.

**Prerequisites**

Prerequisite for admission to examination is the successful completion of the online assessments.

**Recommendation**

None

**Annotation**

The lecture is held in every winter term. The planned lectures and courses for the next three years are announced online.

---

**Below you will find excerpts from events related to this course:**

**Organizational issues**


**Literature**

Weiterführende Literatur:

- Love, Morris, Wesolowsky: Facilities Location: Models and Methods, North Holland, 1988
**8.77 Course: Failure of Structural Materials: Deformation and Fracture [T-MACH-102140]**

**Responsible:** Prof. Dr. Peter Gumbsch  
Dr. Daniel Weygand  

**Organisation:** KIT Department of Mechanical Engineering  

**Part of:** M-MACH-101262 - Emphasis Materials Science

<table>
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**Events**

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<th>Code</th>
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<tr>
<td>WT 23/24</td>
<td>Lecture / Practice / On-Site</td>
<td>3 SWS</td>
<td>Failure of structural materials: deformation and fracture</td>
<td>2181711</td>
<td>76-T-MACH-102140</td>
<td>Gumbsch, Weygand</td>
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**Exams**

<table>
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<th>Date</th>
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<td>ST 2023</td>
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<td>Failure of Structural Materials: Deformation and Fracture</td>
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<td>WT 23/24</td>
<td>76-T-MACH-102140</td>
<td>Failure of Structural Materials: Deformation and Fracture</td>
<td>Weygand, Gumbsch, Kraft</td>
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</table>

**Legend:** 🖥 Online, ☐ Blended (On-Site/Online), 🗣 On-Site, ✗ Cancelled

**Competence Certificate**  
oral exam ca. 30 minutes  
no tools or reference materials

**Prerequisites**  
none

**Recommendation**  
preliminary knowledge in mathematics, mechanics and materials science

*Below you will find excerpts from events related to this course:*  

**Failure of structural materials: deformation and fracture**  
2181711, WS 23/24, 3 SWS, Language: German, [Open in study portal]

Lecture / Practice (VÜ)  
On-Site
Content

1. Introduction
2. Linear elasticity
3. Classification of stresses
4. Failure due to plasticity
   - Tensile test
   - Dislocations
   - Hardening mechanisms
   - Guidelines for dimensioning
5. Composite materials
6. Fracture mechanics
   - Hypotheses for failure
   - Linear elastic fracture mechanics
   - Crack resistance
   - Experimental measurement of fracture toughness
   - Defect measurement
   - Crack propagation
   - Application of fracture mechanics
   - Atomistics of fracture

The student

- Has the basic understanding of mechanical processes to explain the relationship between externally applied load and materials strength.
- Can explain the foundation of linear elastic fracture mechanics and is able to determine if this concept can be applied to a failure by fracture.
- Can describe the main empirical materials models for deformation and fracture and can apply them.
- Has the physical understanding to describe and explain phenomena of failure.

Preliminary knowledge in mathematics, mechanics and materials science recommended
Regular attendance: 22.5 hours
Self-study: 97.5 hours

The assessment consists of an oral examination (ca. 30 min) according to Section 4(2), 2 of the examination regulation.

Organizational issues
Übungsstermine werden in der Vorlesung bekannt gegeben!
nach aktuellem Stand Präsenz

Literature

- Bruchvorgänge in metallischen Werkstoffen, D. Aurich (Werkstofftechnische Verlagsgesellschaft Karlsruhe), relativ einfach aber dennoch umfassender Überblick für metallische Werkstoffe
8.78 Course: Failure of Structural Materials: Fatigue and Creep [T-MACH-102139]

**Responsible:** Dr. Patric Gruber  
Prof. Dr. Peter Gumbsch

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101262 - Emphasis Materials Science

<table>
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<td>Each winter term</td>
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**Events**

| WT 23/24 | 2181715 | Failure of Structural Materials: Fatigue and Creep | 2 SWS | Lecture / 🗣 | Gruber, Gumbsch |

**Exams**

| ST 2023 | 76-T-MACH-102139 | Failure of Structural Materials: Fatigue and Creep | Gruber, Gumbsch |

**Competence Certificate**

oral exam ca. 30 minutes  
no tools or reference materials

**Prerequisites**

none

**Recommendation**

preliminary knowledge in mathematics, mechanics and materials science

*Below you will find excerpts from events related to this course:*

**Failure of Structural Materials: Fatigue and Creep**

2181715, WS 23/24, 2 SWS, Language: German, Open in study portal
Content

1 Fatigue
1.1 Introduction
1.2 Lifetime
1.3 Fatigue Mechanisms
1.4 Material Selection
1.5 Notches and Shape Optimization
1.6 Case Studies: ICE-Accidents

2 Creep
2.1 Introduction
2.2 High Temperature Plasticity
2.3 Phenomenological Description of Creep
2.4 Creep Mechanisms
2.5 Alloying Effects

The student

- has the basic understanding of mechanical processes to explain the relationships between externally applied load and materials strength.
- can describe the main empirical materials models for fatigue and creep and can apply them.
- has the physical understanding to describe and explain phenomena of failure.
- can use statistical approaches for reliability predictions.
- can use its acquired skills, to select and develop materials for specific applications.

Preliminary knowledge in mathematics, mechanics and materials science recommended

Regular attendance: 22.5 hours
Self-study: 97.5 hours

The assessment consists of an oral examination (ca. 30 min) according to Section 4(2), 2 of the examination regulation.

Literature

- Bruchvorgänge in metallischen Werkstoffen, D. Aurich (Werkstofftechnische Verlagsgesellschaft Karlsruhe), relativ einfach aber dennoch umfassender Überblick für metallische Werkstoffe
- Fatigue of Materials, Subra Suresh (2nd Edition, Cambridge University Press); Standardwerk über Ermüdung, alle Materialklassen, umfangreich, für Einsteiger und Fortgeschrittene
## 8.79 Course: Financial Accounting for Global Firms [T-WIWI-107505]

### Responsible:
Dr. Torsten Luedecke

### Organisation:
KIT Department of Economics and Management

### Part of:
- M-WIWI-101423 - Topics in Finance II
- M-WIWI-101465 - Topics in Finance I

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### Events

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<th>2530242</th>
<th>Financial Accounting for Global Firms</th>
<th>2 SWS</th>
<th>Lecture / On-Site</th>
<th>Luedecke</th>
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### Exams

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<td>WT 23/24</td>
<td>7900142</td>
<td>Financial Accounting for Global Firms</td>
<td>Luedecke, Ruckes</td>
</tr>
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</table>

**Legend:** 🖥 Online, 🏬 Blended (On-Site/Online), 🗣 On-Site, ❌ Cancelled

### Competence Certificate
The assessment consists of a written exam (60 min.) according to § 4 paragraph 2 Nr. 1 of the examination regulation.

### Prerequisites
None

### Recommendation
Basic knowledge in corporate finance and accounting.

### Annotation
New lecture in the winter term 2017/18.

### Below you will find excerpts from events related to this course:

**Financial Accounting for Global Firms**
2530242, WS 23/24, 2 SWS, Language: English, [Open in study portal](#)

### Literature
8.80 Course: Financial Data Science [T-WIWI-111238]

**Responsible:** Prof. Dr. Maxim Ulrich

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-105610 - Financial Data Science

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<td>Financial Data Science</td>
<td>Ulrich</td>
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**Competence Certificate**

Due to the professor's research sabbatical, the BSc module "Financial Data Science" and MSc module "Foundations for Advanced Financial -Quant and -Machine Learning Research" and the MSc module "Advanced Machine Learning and Data Science" along with the respective examinations will not be offered in SS2023. Bachelor and Master thesis projects are not affected and will be supervised.

The module examination is an alternative exam assessment and consists of two parts in which a maximum of 100 points can be achieved:

In the first part of the examination, a maximum of 30 points can be achieved, which are distributed equally weighted over eight worksheets to be submitted during the semester. The worksheets of the first three weeks are representative for all following worksheets in terms of scope and degree of difficulty. With the beginning of the 4th week of the course, the handing in of the worksheets is considered to be part of the alternative exam assessment.

A maximum of 70 points can be achieved in the second part of the examination. For this part of the examination, the student write a "Final Exam" in the last week of the lecture period, which takes 2 hours.

Detailed information about the course schedule and the module exam will be announced at the first course date.

A retake opportunity for those who do not pass the module exam will take place at the end of the fourth September calendar week of the same year. The registration for the examination must be made at least 1 day before the beginning of the examination. The following applies to deregistration for the examination: Deregistration can be made online in the student portal up to 1 day before the start of the examination.

**Prerequisites**

None.

**Annotation**

Please note that the course is only offered every second summer semester (SS2021, SS2023).
Course: Financial Econometrics [T-WIWI-103064]

Responsibility: Prof. Dr. Melanie Schienle
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101599 - Statistics and Econometrics
M-WIWI-105414 - Statistics and Econometrics II

Type | Credits | Grading scale | Recurrence | Version
--- | --- | --- | --- | ---
Written examination | 4.5 | Grade to a third | Each winter term | 2

Events

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Exams

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Competence Certificate
The assessment consists of a written exam (90 minutes) (following §4(2), 1 of the examination regulation).

Prerequisites
None

Recommendation
Knowledge of the contents covered by the course "Economics III: Introduction in Econometrics" [2520016]

Annotation
The next lecture will take place in the winter semester 2022/23.

Below you will find excerpts from events related to this course:

Financial Econometrics I
2520022, WS 23/24, 2 SWS, Language: English, [Open in study portal]

Content
Learning objectives:
The student
- shows a broad knowledge of financial econometric estimation and testing techniques
- is able to apply his/her technical knowledge using software in order to critically assess empirical problems

Content:
ARMA, ARIMA, ARFIMA, (non)stationarity, causality, cointegration, ARCH/GARCH, stochastic volatility models, computer based exercises

Requirements:
It is recommended to attend the course Economics III: Introduction to Econometrics [2520016] prior to this course.

Workload:
Total workload for 4.5 CP: approx. 135 hours
Attendance: 30 hours
Preparation and follow-up: 65 hours
Exam preparation: 40 hours
Literature
Additional literature will be discussed in the lecture.
### 8.82 Course: Financial Econometrics II [T-WIWI-110939]

**Responsible:** Prof. Dr. Melanie Schienle  
**Organisation:** KIT Department of Economics and Management  
**Part of:**  
- M-WIWI-101599 - Statistics and Econometrics  
- M-WIWI-105414 - Statistics and Econometrics II

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**Competence Certificate**  
Written examination (90 minutes). If the number of participants is low, an oral examination will be held instead.

**Prerequisites**  
None

**Recommendation**  
Knowledge of the contents covered by the course "Financial Econometrics"

**Annotation**  
Course language is English  
The next lecture will take place in the summer semester of 2023.
# 8.83 Course: Financial Intermediation [T-WIWI-102623]

**Responsible:** Prof. Dr. Martin Ruckes  
**Organisation:** KIT Department of Economics and Management  
**Part of:**  
- M-WIWI-101423 - Topics in Finance II  
- M-WIWI-101465 - Topics in Finance I

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**Competence Certificate**  
The assessment of this course is a written examination (following §4(2), 1 SPO) of 60 mins. The exam is offered each semester.

**Prerequisites**  
None

**Recommendation**  
None

**Below you will find excerpts from events related to this course:**

## Lecture/V: Financial Intermediation  
2530232, WS 23/24, 2 SWS, Language: German, Open in study portal  
Lecture (V)  
On-Site

**Organizational issues**  
Terminankündigungen des Instituts beachten

**Literature**  
Weiterführende Literatur:
8.84 Course: Financial Management [T-WIWI-102605]

**Responsible:** Prof. Dr. Martin Ruckes  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101435 - Essentials of Finance

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**Exams**

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**Competence Certificate**

The assessment consists of a written exam (60 min.) according to Section 4 (2), 1 of the examination regulation. The exam takes place at every semester. Re-examinations are offered at every ordinary examination date.

**Prerequisites**

None

**Recommendation**

Knowledge of the content of the course Business Administration: Finance and Accounting [25026/25027] is recommended.

**Below you will find excerpts from events related to this course:**

**Financial Management**

2530216, SS 2023, 2 SWS, Language: German, [Open in study portal](#)

**Literature**

**Weiterführende Literatur:**

8.85 Course: FinTech [T-WIWI-112694]

**Responsible:** TT-Prof. Dr. Julian Thimme

**Organisation:** KIT Department of Economics and Management

**Part of:**
- M-WIWI-101402 - eFinance
- M-WIWI-101423 - Topics in Finance II
- M-WIWI-101465 - Topics in Finance I

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**Competence Certificate**

Written examination (90 minutes) during the lecture-free period of the semester (according to §4(2), 1 SPO).

The examination is offered every semester and can be repeated at any regular examination date.

**Prerequisites**

None

**Recommendation**

Knowledge of the course Business Administration: Finance and Accounting [25026/25027] is very helpful.
8.86 Course: Fluid Power Systems [T-MACH-102093]

**Responsible:** Prof. Dr.-Ing. Marcus Geimer

**Organisation:** KIT Department of Mechanical Engineering

**Part of:**
- M-MACH-101266 - Automotive Engineering
- M-MACH-101267 - Mobile Machines

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<td>Grade to a third</td>
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**Exams**

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**Competence Certificate**
The assessment consists of a written exam (90 minutes) taking place in the recess period. The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

**Prerequisites**
none

**Below you will find excerpts from events related to this course:**

**Fluid Technology**

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**Content**
In the range of hydrostatics the following topics will be introduced:
- Hydraulic fluids
- Pumps and motors
- Valves
- Accessories
- Hydraulic circuits.

In the range of pneumatics the following topics will be introduced:
- Compressors
- Motors
- Valves
- Pneumatic circuits.
- regular attendance: 21 hours
- self-study: 92 hours

**Literature**
Skriftum zur Vorlesung Fluidtechnik
Institut für Fahrzeugsystemtechnik
downloadbar
Course: Foundations of Informatics I [T-WIWI-102749]

8.87

**Responsible:** Dr.-Ing. Michael Färber

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-101417 - Foundations of Informatics

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<td>ST 2023</td>
<td>Practice / 🗣</td>
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</table>

**Competence Certificate**
The assessment consists of an 1h written exam according to Section 4 (2), 1 of the examination regulation.
The exam takes place every semester. Re-examinations are offered at every ordinary examination date.

**Prerequisites**
None

Below you will find excerpts from events related to this course:

**Foundations of Informatics I**

2511010, SS 2023, 2 SWS, Language: German, Open in study portal

**Lecture (V)**

**On-Site**

**Content**
The lecture provides an introduction to basic concepts of computer science and software engineering. Essential theoretical foundations and problem-solving approaches, which are relevant in all areas of computer science, are presented and explained, as well as shown in practical implementations.

The following topics are covered:

- Object Oriented Modeling
- Logic (Propositional Calculus, Predicate Logic, Boolean Algebra)
- Algorithms and Their Properties
- Sort-and Search-Algorithms
- Complexity Theory
- Problem Specification
- Dynamic Data Structures

**Learning objectives:**
The student

- is able to formalise tasks in the domain of informatics and is able to identify solution methods
- knows the basic terminology of computer science and is capable of applying these terms to different problems.
- knows basic programming structures and is able to apply them (particularly simple data structures, object interaction and implementation of basic algorithms).

**Workload:**

- The total workload for this course is approximately 150 hours
- Time of presentness: 45 hours
- Time of preparation and postprocessing: 67.5 hours
- Exam and exam preparation: 37.5 hours
Content
The exercises are related to the lecture Foundations of Informatics I.

Multiple exercises are held that capture the topics, held in the lecture Foundations of Informatics I, and discuss them in detail. Thereby, practical examples are given to the students in order to transfer theoretical aspects into practical implementation.

The following topics are covered:

- Object Oriented Modeling
- Logic (Propositional Calculus, Predicate Logic, Boolean Algebra)
- Algorithms and Their Properties
- Sort-and Search-Algorithms
- Complexity Theory
- Problem Specification
- Dynamic Data Structures

Learning objectives:

The student

- is able to formalise tasks in the domain of informatics and is able to identify solution methods
- knows the basic terminology of computer science and is capable of applying these terms to different problems.
- knows basic programming structures and is able to apply them (particularly simple data structures, object interaction and implementation of basic algorithms).

Literature

Course: Foundations of Informatics II [T-WIWI-102707]

**Responsible:** Prof. Dr. Sanja Lazarova-Molnar

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-101417 - Foundations of Informatics

---

**Type:** Written examination  
**Credits:** 5  
**Grading scale:** Grade to a third  
**Recurrence:** Each winter term  
**Version:** 1

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**Exams**

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**Competence Certificate**
The assessment consists of a written exam according to Section 4(2), 1 of the examination regulation. The examination takes place every semester. Re-examinations are offered at every ordinary examination date.

**Prerequisites**
None

**Recommendation**
It is recommended to attend the course "Foundations of Informatics I" beforehand.  
Active participation in the practical lessons is strongly recommended.

---

**Below you will find excerpts from events related to this course:**

**Foundations of Informatics II**  
2511012, WS 23/24, 3 SWS, Language: German, Open in study portal

**Content**
The lecture deals with formal models for automata, languages and algorithms as well as real instances of these models, i.e. computer architecture and organization (hardware development, computer arithmetic, architecture models), programming languages (different language levels, from microprogramming to higher programming languages, as well as compiling and execution), operating systems and modes (architecture and properties of operating systems, operating system tasks, client-server systems), data organization and management (types of data organization, primary and secondary organization).

**Learning objectives:**
- Students acquire vast knowledge of methods and concepts in theoretical computer science and computer architectures.  
- Based on the acquired knowledge and skills, students are capable of choosing and applying the appropriate methods and concepts for well-defined problem instances.  
- Active participation in the tutorials enables students to acquire the necessary knowledge for developing appropriate solutions cooperatively.

**Recommendations:**
It is recommended to attend the course Foundations of Informatics I [2511010] beforehand.  
Active participation in the practical lessons is strongly recommended.

**Workload:**
The total workload for this course is approximately 150 hours.

**Organizational issues**
Die Vorlesung wird zu Beginn des Semesters 4-stündig und am Ende 2-stündig gelesen, um eine bessere Abdeckung des Inhalts in den Übungen zu gewährleisten.
Literatur
Weiterführende Literatur:
Literatur wird in der Vorlesung bekannt gegeben.
Course: Foundations of Interactive Systems [T-WIWI-109816]

**Responsible:** Prof. Dr. Alexander Mädche

**Organisation:** KIT Department of Economics and Management

**Part of:**
- M-WIWI-101434 - eBusiness and Service Management
- M-WIWI-102752 - Fundamentals of Digital Service Systems
- M-WIWI-105928 - HR Management & Digital Workplace
- M-WIWI-105981 - Information Systems & Digital Business

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**Events**

| ST 2023 | 2540560 | Foundations of Interactive Systems | 3 SWS | Lecture / 🧩 | Mädche, Toreini |

**Exams**

| ST 2023 | 7900247 | Foundations of Interactive Systems | Lecture (V) |

**Legend:** 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✗ Cancelled

**Competence Certificate**
Alternative exam assessment. The assessment is carried out in the form of a one-hour written examination and by carrying out a Capstone project.
Details on the assessment will be announced during the lecture.

**Prerequisites**
None

**Recommendation**
None

**Below you will find excerpts from events related to this course:**

**Foundations of Interactive Systems**

2540560, SS 2023, 3 SWS, Language: English, [Open in study portal](#)
Content
Lecture Description
Computers have evolved from batch processors to highly interactive systems. This offers new possibilities besides challenges for designing a successful interaction between humans and computers. Interactive systems are socio-technical systems in which users perform tasks by interacting with technology in a specific context to achieve specified goals and outcomes.
This lecture introduces key concepts and principles of interactive systems from a human and computer perspective. From a human perspective, we discuss selected individual characteristics, cognitive processes, the interplay between cognition and activity, as well as mental models. From a computer perspective, we introduce established interaction technologies as well as contemporary multimodal technologies (e.g., augmented/mixed reality, eye-based interaction, etc.). We also introduce established principles and guidelines for designing user interfaces. Furthermore, we describe the human-centered design process for interactive systems and supporting techniques & tools (e.g., personas, prototyping, user testing).
With this lecture, students acquire foundational knowledge to successfully design the interaction between humans and computers in business and private life. The course is complemented with a Design Capstone Project, where students in a team apply design methods & techniques to create an interactive prototype.

Learning Objectives
The students
- have a basic understanding of key conceptual and theoretical foundations of interactive systems from a human and computer perspective
- are aware of important design principles for the design of important classes of interactive systems
- know design processes and techniques for developing interactive systems
- know how to apply the knowledge and skills gathered in the lecture for a real-world problem (as part of design capstone project)

Prerequisites: No specific prerequisites are required for the lecture
Language of instruction: English

Bibliography

Further literature will be made available in the lecture. In case of questions feel free to approach Moritz Langner (moritz.langner@kit.edu)

Die Erfolgskontrolle erfolgt in Form einer Prüfungsleistung anderer Art (Form) nach § 4 Abs. 2 Nr. 3 SPO. Die Leistungskontrolle erfolgt in Form einer einständigen Klausur und der Durchführung eines Capstone Projektes. Details zur Ausgestaltung der Erfolgskontrolle werden im Rahmen der Vorlesung bekannt gegeben.
Course: Foundations of Mobile Business [T-WIWI-104679]

**Responsible:** Prof. Dr. Andreas Oberweis

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-101426 - Electives in Informatics

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**Events**

| Events | Code     | Title                                                                 | SWS | Type            | Responsible |
|--------|----------|                                                                      |     |                 |             |
| ST 2023| 2511226  | Foundations of mobile Business                                       | 2   | Lecture / 🗣️   | Schiefer, Frister |
| ST 2023| 2511227  | Exercises Foundations of mobile Business                             | 1   | Practice / 🗣️  | Schiefer, Frister |

**Exams**

| Events | Code     | Title                                                                 | SWS | Type            | Responsible |
|--------|----------|                                                                      |     |                 |             |
| ST 2023| 79AIFB_GMB_C5 | Foundations of mobile Business (Registration until 17 July 2023) |     |                 | Oberweis    |
| WT 23/24| 79AIFB_GMB_A1 | Foundations of Mobile Business                                      | 1   |                 | Oberweis    |

**Competence Certificate**
The assessment of this course is a written (60 min.) or (if necessary) oral examination according to §4(2) of the examination regulation.

**Prerequisites**
None

**Annotation**
Lecture and exercises are integrated.

Below you will find excerpts from events related to this course:

**Foundations of mobile Business**
2511226, SS 2023, 2 SWS, Language: German, Open in study portal

**Content**
The lecture covers the basics of mobile business with a focus on (information) technical basics. These are interlinked with the economic background in Germany.

Contents are:
1. organizational matters
2. introduction & definitions
3. mobile devices
4. mobile radio technologies
5. mobile communications market
6. mobile applications
7. digital radio technologies
8. location & context

Note: The teaching units listed above each have a different scope.

**Learning objectives:**
If you are confronted with a question in your job which affects "Mobile Business", you should be able to provide answers quickly and competently:

Market structures
technique
Possibilities for applications
lawsuits
issues

**Workload:**
The total workload for this course unit is approx. 135 hours (4.5 credit points).
Organizational issues
Vorlesung und Übung werden integriert angeboten.

Literature

  http://www.mi.fu-berlin.de/inf/groups/ag-tech/teaching/resources/Mobile_Communications/course_Material/index.html
- Martin Sauter: Grundkurs Mobile Kommunikationssysteme (6. Aufl. 2015)
- Mansfeld, W.: Satellitenortung und Navigation:
  Grundlagen, Wirkungsweise und Anwendung globaler Satellitenavigationssysteme
- Dodel, H., Häupler, D.: Satellitenavigation

Einige relevante Informationen im Web

- Bundesnetzagentur http://www.bundesnetzagentur.de
  u.a. Jahresbericht und Marktbeobachtung
- VATM-Marktstudien
  http://www.vatm.de/vatm-marktstudien.html
- Verbände, bspw. BITKOM (bitkom.org), eco e.V. (eco.de)
- Presse, bspw. Teltarif, Heise, Golem, …
- Statistiken (Statista Lizenz des KIT)
8.91 Course: Fuels and Lubricants for Combustion Engines [T-MACH-105184]

**Responsible:** Hon.-Prof. Dr. Bernhard Ulrich Kehrwald
Dr.-Ing. Heiko Kubach

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101303 - Combustion Engines II

**Type**
Oral examination

**Credits**
4

**Grading scale**
Grade to a third

**Recurrence**
Each winter term

**Version**
1

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<td>Fuels and Lubricants for Combustion Engines</td>
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**Competence Certificate**
oral examination, Duration: ca. 25 min., no auxiliary means

**Prerequisites**
none

Below you will find excerpts from events related to this course:

**Fuels and Lubricants for Combustion Engines**
2133108, WS 23/24, 2 SWS, Language: German, Open in study portal

**Content**
electric drives and fuel cell drives with the associated operating materials will also be presented

- Introduction, basics, primary energy and energy chains
- Illustrative chemistry of hydrocarbons
- Fossil fuels, exploration, processing, standards
- Operating materials not fossil, renewable, alternative
- Fuels, lubricants, coolants, AdBlue
- Laboratory analysis, testing, test benches and measurement technology
- Excursion to test fields for motorized drives from 0.5 to 3,500 kW

**Literature**
Skript
### 8.92 Course: Functional Ceramics [T-MACH-105179]

| Responsible: | Dr. Manuel Hinterstein  
|              | Dr.-Ing. Wolfgang Rheinheimer |
| Organisation: | KIT Department of Mechanical Engineering |

Part of: **M-MACH-101262 - Emphasis Materials Science**

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#### Events

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<td>Each winter term</td>
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#### Exams

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<td>Lecture / 🧩</td>
<td>Grade to a third</td>
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<td>Hinterstein</td>
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**Competence Certificate**

The assessment consists of an oral exam (20 min) taking place at the agreed date.

Auxiliary means: none

The re-examination is offered upon agreement.

**Prerequisites**

none
8.93 Course: Fundamentals for Design of Motor-Vehicle Bodies I [T-MACH-102116]

**Responsible:** Dipl.-Ing. Horst Dietmar Bardehle  
**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101266 - Automotive Engineering

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Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

**Competence Certificate**

Oral group examination

**Duration:** 30 minutes

**Auxiliary means:** none

**Prerequisites**

none

Below you will find excerpts from events related to this course:

**Fundamentals for Design of Motor-Vehicles Bodies I**

2113814, WS 23/24, 1 SWS, Language: German, Open in study portal

**Content**

1. History and design
2. Aerodynamics
3. Design methods (CAD/CAM, FEM)
4. Manufacturing methods of body parts
5. Fastening technology
6. Body in white / body production, body surface

**Learning Objectives:**

The students have an overview of the fundamental possibilities for design and manufacture of motor-vehicle bodies. They know the complete process, from the first idea, through the concept to the dimensioned drawings (e.g. with FE-methods). They have knowledge about the fundamentals and their correlations, to be able to analyze and to judge relating components as well as to develop them accordingly.

**Organizational issues**

Das Vorlesungsmaterial wird auf ILIAS bereitgestellt. Das ILIAS-Passwort erhalten Sie unter https://fast-web-01.fast.kit.edu/Passwoerterillas/

Termine und nähere Informationen: siehe ILIAS oder Instituts homepage

Dates and further information will be published on the homepage of the institute.
Literature
1. Automobiltechnische Zeitschrift ATZ, Friedr. Vieweg & Sohn Verlagsges. mbH, Wiesbaden
2. Automobil Revue, Bern (Schweiz)
3. Automobil Produktion, Verlag Moderne Industrie, Landsberg
8.94 Course: Fundamentals for Design of Motor-Vehicle Bodies II [T-MACH-102119]

**Responsible:** Dipl.-Ing. Horst Dietmar Bardehle

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101266 - Automotive Engineering

**Type**  
Oral examination

**Credits**  
1.5

**Grading scale**  
Grade to a third

**Recurrence**  
Each summer term

**Version**  
1

### Events

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### Exams

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Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗗 On-Site, ✗ Cancelled

### Competence Certificate

**Oral group examination**

**Duration:** 30 minutes

**Auxiliary means:** none

### Prerequisites

none

**Below you will find excerpts from events related to this course:**

**Fundamentals for Design of Motor-Vehicles Bodies II**

2114840, SS 2023, 1 SWS, Language: German, [Open in study portal](#)

**Lecture (V)**

**On-Site**

**Content**

1. Body properties/testing procedures
2. External body-parts
3. Interior trim
4. Compartment air conditioning
5. Electric and electronic features
6. Crash tests
7. Project management aspects, future prospects

**Learning Objectives:**

The students know that, often the design of seemingly simple detail components can result in the solution of complex problems. They have knowledge in testing procedures of body properties. They have an overview of body parts such as bumpers, window lift mechanism and seats. They understand, as well as, parallel to the normal electrical system, about the electronic side of a motor vehicle. Based on this they are ready to analyze and to judge the relation of these single components. They are also able to contribute competently to complex development tasks by imparted knowledge in project management.

### Organizational issues

**Scheduled dates, further Information and possible changes of date:**

see homepage of the institute.
Literature
1. Automobiltechnische Zeitschrift ATZ, Friedr. Vieweg & Sohn Verlagsges. mbH, Wiesbaden
2. Automobil Revue, Bern (Schweiz)
3. Automobil Produktion, Verlag Moderne Industrie, Landsberg
8.95 Course: Fundamentals in the Development of Commercial Vehicles [T-MACH-111389]

**Responsible:** Christof Weber  
**Organisation:** KIT Department of Mechanical Engineering  
**Part of:**  
- M-MACH-101265 - Vehicle Development  
- M-MACH-101267 - Mobile Machines

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**Exams**

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**Competence Certificate**  
Oral group examination  
Duration: appr. 30 minutes  
Auxiliary means: none

**Prerequisites**  
none

**Annotation**  
Fundamentals in the Development of Commercial Vehicles I, WT  
Fundamentals in the Development of Commercial Vehicles II, ST

Below you will find excerpts from events related to this course:

**Fundamentals in the Development of Commercial Vehicles II**  
2114844, SS 2023, 1 SWS, Language: German, [Open in study portal](#)

**Content**

1. Gear boxes of commercial vehicles  
2. Intermediate elements of the drive train  
3. Axle systems  
4. Front axles and driving dynamics  
5. Chassis and axle suspension  
6. Braking System  
7. Systems  
8. Excursion

**Learning Objectives:**  
The students know the advantages and disadvantages of different drives. Furthermore they are familiar with components, such as transfer box, propeller shaft, powered and non-powered front axle etc. Beside other mechanical components, such as chassis, axle suspension and braking system, also electric and electronic systems are known. Consequently the student are able to analyze and to judge the general concepts as well as to adjust them precisely with the area of application.
Organizational issues
Genaue Termine sowie nähere Informationen und eventuelle Terminänderungen:
siehe Instituts homepage.

Literature
1. HILGERS, M.: Nutzfahrzeugtechnik lernen, Springer Vieweg, ISSN: 2510-1803

Fundamentals in the Development of Commercial Vehicles I
2113812, WS 23/24, 1 SWS, Language: German, Open in study portal

Content
1. Introduction, definitions, history
2. Development tools
3. Complete vehicle
4. Cab, bodyshell work
5. Cab, interior fitting
6. Alternative drive systems
7. Drive train
8. Drive system diesel engine
9. Intercooled diesel engines

Learning Objectives:
The students have proper knowledge about the process of commercial vehicle development starting from the concept and the underlying original idea to the real design. They know that the customer requirements, the technical realisability, the functionality and the economy are important drivers.

The students are able to develop parts and components. Furthermore they have knowledge about different cab concepts, the interior and the interior design process. Consequently they are ready to analyze and to judge concepts of commercial vehicles as well as to participate competently in the commercial vehicle development.

Organizational issues
Das Vorlesungsmaterial wird auf ILIAS bereitgestellt. Das ILIAS-Passwort erhalten Sie unter https://fast-web-01.fast.kit.edu/PasswoerterIlias/

Termine und Nähere Informationen: siehe ILIAS oder Instituts homepage

Dates and further information will be published on the homepage of the institute.

Literature
8.96 Course: Fundamentals of Automobile Development I [T-MACH-105162]

**Responsible:** Prof.Dipl.-Ing. Rolf Frech

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101265 - Vehicle Development

**Type:** Written examination  
**Credits:** 1.5  
**Grading scale:** Grade to a third  
**Recurrence:** Each winter term  
**Version:** 1

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<td>Fundamentals of Automobile Development I</td>
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<td>2113851</td>
<td>Principles of Whole Vehicle Engineering I</td>
<td>Lecture / Online</td>
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</table>

**Competition Certificate**
Written examination

**Duration:** 90 minutes

**Auxiliary means:** none

**Prerequisites**
none

Below you will find excerpts from events related to this course:

**Fundamentals of Automobile Development I**
2113810, WS 23/24, 1 SWS, Language: German, Open in study portal

**Lecture (V)**
On-Site

**Content**
1. Process of automobile development
2. Conceptual dimensioning and design of an automobile
3. Laws and regulations - National and international boundary conditions
4. Aero dynamical dimensioning and design of an automobile I
5. Aero dynamical dimensioning and design of an automobile II
6. Thermo-management in the conflict of objectives between styling, aerodynamic and packaging guidelines I
7. Thermo-management in the conflict of objectives between styling, aerodynamic and packaging guidelines II

**Learning Objectives**
The students have an overview of the fundamentals of the development of automobiles. They know the development process, the national and the international legal requirements that are to be met. They have knowledge about the thermo-management, aerodynamics and the design of an automobile. They are ready to judge goal conflicts in the field of automobile development and to work out approaches to solving a problem.

**Organizational Issues**
Das Vorlesungsmaterial wird auf ILIAS bereitgestellt. Das ILIAS-Passwort erhalten Sie unter https://fast-web-01.fast.kit.edu/PasswoerterIlis/ 

Termine und nähere Informationen finden Sie auf der Institutshomepage.

Kann nicht mit Lehrveranstaltung 2113851 kombiniert werden.

Date and further information will be published on the homepage of the institute.

Cannot be combined with lecture 2113851.
Literature
Skript zur Vorlesung wird zu Beginn des Semesters ausgegeben
The scriptum will be provided during the first lessons

**Principles of Whole Vehicle Engineering I**
2113851, WS 23/24, 1 SWS, Language: English, [Open in study portal](#)

**Content**
1. Process of automobile development
2. Conceptual dimensioning and design of an automobile
3. Laws and regulations – National and international boundary conditions
4. Aero dynamical dimensioning and design of an automobile I
5. Aero dynamical dimensioning and design of an automobile II
6. Thermo-management in the conflict of objectives between styling, aerodynamic and packaging guidelines I
7. Thermo-management in the conflict of objectives between styling, aerodynamic and packaging guidelines II

**Learning Objectives:**
The students have an overview of the fundamentals of the development of automobiles. They know the development process, the national and the international legal requirements that are to be met. They have knowledge about the thermo-management, aerodynamics and the design of an automobile. They are ready to judge goal conflicts in the field of automobile development and to work out approaches to solving a problem.

**Organizational issues**
You will find the lecture material on ILIAS. To get the ILIAS password, KIT students refer to [https://fast-web-01.fast.kit.edu/Passwoerterilias/](https://fast-web-01.fast.kit.edu/Passwoerterilias/)
Termine und nähere Informationen finden Sie auf der Institutshomepage.

Data and further information will be published on the homepage of the institute.
Kann nicht mit Lehrveranstaltung 2113810 kombiniert werden
Cannot be combined with lecture 2113810.

**Literature**
Skript zur Vorlesung wird zu Beginn des Semesters ausgegeben
The scriptum will be provided during the first lessons
Course: Fundamentals of Automobile Development II [T-MACH-105163]

**Responsible:** Prof. Dipl.-Ing. Rolf Frech

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101265 - Vehicle Development

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<tr>
<td>WT 23/24 76-T-MACH-105163 Fundamentals of Automobile Development II Frech, Unrau</td>
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</table>

**Competence Certificate**

Written examination

Duration: 90 minutes

Auxiliary means: none

**Prerequisites**

none

Below you will find excerpts from events related to this course:

**Principles of Whole Vehicle Engineering II**

2114842, SS 2023, 1 SWS, Language: German, Open in study portal

**Content**

1. Application-oriented material and production technology I
2. Application-oriented material and production technology II
3. Overall vehicle acoustics in the automobile development
4. Drive train acoustics in the automobile development
5. Testing of the complete vehicle
6. Properties of the complete automobile

**Learning Objectives:**

The students are familiar with the selection of appropriate materials and the choice of adequate production technology. They have knowledge of the acoustical properties of the automobiles, covering both the interior sound and exterior noise. They have an overview of the testing procedures of the automobiles. They know in detail the evaluation of the properties of the complete automobile. They are ready to participate competently in the development process of the complete vehicle.

**Organizational issues**

Vorlesung findet als Blockvorlesung am Campus Ost, Geb. 70.04, Raum 219 statt. Termine werden über die Homepage bekannt gegeben.

Kann nicht mit der Veranstaltung [2114860] kombiniert werden.

Cannot be combined with lecture [2114860].

**Literature**

Skript zur Vorlesung ist über ILIAS verfügbar.
Content
1. Application-oriented material and production technology I
2. Application-oriented material and production technology II
3. Overall vehicle acoustics in the automobile development
4. Drive train acoustics in the automobile development
5. Testing of the complete vehicle
6. Properties of the complete automobile

Learning Objectives:
The students are familiar with the selection of appropriate materials and the choice of adequate production technology. They have knowledge of the acoustical properties of the automobiles, covering both the interior sound and exterior noise. They have an overview of the testing procedures of the automobiles. They know in detail the evaluation of the properties of the complete automobile. They are ready to participate competently in the development process of the complete vehicle.

Organizational issues
Kann nicht mit der Veranstaltung [2114842] kombiniert werden.
Cannot be combined with lecture [2114842].
Veranstaltung findet am Campus Ost, Geb. 70.04, Raum 219 statt. Genaue Termine entnehmen Sie bitte der Institushomepage.
Scheduled dates:
see homepage of the institute.

Literature
Das Skript zur Vorlesung ist über ILIAS verfügbar.
8.98 Course: Fundamentals of Catalytic Exhaust Gas Aftertreatment [T-MACH-105044]

**Course:** Fundamentals of Catalytic Exhaust Gas Aftertreatment [T-MACH-105044]

**Responsible:** Prof. Dr. Olaf Deutschmann
Prof. Dr. Jan-Dierk Grunwaldt
Dr.-Ing. Heiko Kubach
Hon.-Prof. Dr. Egbert Lox

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101303 - Combustion Engines II

**Type:** Oral examination
**Credits:** 4
**Grading scale:** Grade to a third
**Recurrence:** Each summer term
**Version:** 1

**Events**

| ST 2023 | 2134138 | Fundamentals of catalytic exhaust gas aftertreatment | 2 SWS | Lecture / 🗣 | Lox, Grunwaldt, Deutschmann |

**Exams**

| ST 2023 | 76-T-MACH-105044 | Fundamentals of Catalytic Exhaust Gas Aftertreatment | Lox |

Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ❌ Cancelled

**Competence Certificate**
oral examination, Duration: 25 min., no auxiliary means

**Prerequisites**
none

*Below you will find excerpts from events related to this course:*

**Fundamentals of catalytic exhaust gas aftertreatment**

2134138, SS 2023, 2 SWS, Language: German, Open in study portal

**Organizational issues**
Blockvorlesung, Termin und Ort werden auf Ilias sowie der Homepage des IFKM und ITCP bekannt gegeben.

**Literature**

T 8.99 Course: Fundamentals of Production Management [T-WIWI-102606]

Responsible: Prof. Dr. Frank Schultmann
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101437 - Industrial Production I

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Events

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<td>Lecture / On-Site</td>
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<td>Übungen Grundlagen der Produktionswirtschaft</td>
<td>2 SWS</td>
<td>Practice / On-Site</td>
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Exams

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<td>Schultmann</td>
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Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate
The assessment consists of a written exam (90 minutes) (following §4(2) of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date. Depending on the respective pandemic situation, the exam may be offered as an open book exam (alternative exam assessment, following §4(2), 3 of the examination regulation).

Prerequisites
None

Below you will find excerpts from events related to this course:

V Fundamentals of Production Management
2581950, SS 2023, 2 SWS, Language: German, Open in study portal

Content
This lecture focuses on strategic production management with respect to various economic aspects. Interdisciplinary approaches of systems theory will be used to describe the challenges of industrial production. This course will emphasize the importance of R&D as the central step in strategic corporate planning to ensure future long-term success. In the field of site selection and planning for firms and factories, attention will be drawn upon individual aspects of existing and greenfield sites as well as existing distribution and supply centres. Students will obtain knowledge in solving internal and external transport and storage problems.

Organizational issues
Blockveranstaltung, siehe Institutsaushang

Literature
Wird in der Veranstaltung bekannt gegeben.
Course: Gear Cutting Technology [T-MACH-102148]

Responsible: Hon.-Prof. Dr. Markus Klaiber
Organisation: KIT Department of Mechanical Engineering
Part of: M-MACH-101265 - Vehicle Development
          M-MACH-106590 - Production Engineering

Type | Credits | Grading scale | Recurrence | Version
---|---------|---------------|------------|--------
Oral examination | 4 | Grade to a third | Each winter term | 1

Events

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<td>Gear Technology</td>
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<td>Klaiber</td>
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Competence Certificate
Oral Exam (20 min)

Prerequisites
none

Below you will find excerpts from events related to this course:

**Gear Technology**

2149655, WS 23/24, 2 SWS, Language: German, Open in study portal

Lecture (V) On-Site

Content

Based on the gearing theory, manufacturing processes and machine technologies for producing gearings, the needs of modern gear manufacturing will be discussed in the lecture. For this purpose, various processes for various gear types are taught which represent the state of the art in practice today. A classification in soft and hard machining and furthermore in cutting and non-cutting technologies will be made. For comprehensive understanding the processes, machine technologies, tools and applications of the manufacturing of gearings will be introduced and the current developments presented. For assessment and classification of the applications and the performance of the technologies, the methods of mass production and manufacturing defects will be discussed. Sample parts, reports from current developments in the field of research and an excursion to a gear manufacturing company round out the lecture.

Learning Outcomes:

The students...

- can describe the basic terms of gearings and are able to explain the imparted basics of the gearwheel and gearing theory.
- are able to specify the different manufacturing processes and machine technologies for producing gearings. Furthermore they are able to explain the functional principles and the dis-/advantages of these manufacturing processes.
- can apply the basics of the gearing theory and manufacturing processes on new problems.
- are able to read and interpret measuring records for gearings. are able to make an appropriate selection of a process based on a given application.
- can describe the entire process chain for the production of toothed components and their respective influence on the resulting workpiece properties.

Workload:

regular attendance: 21 hours
self-study: 99 hours
Literature
Medien:
Skrift zur Veranstaltung wird über (https://ilias.studium.kit.edu/) bereitgestellt.
Media:
Lecture notes will be provided in Ilias (https://ilias.studium.kit.edu/).
### 8.101 Course: Geological Hazards and Risk [T-PHYS-103525]

**Responsible:** Dr. Andreas Schäfer  
**Organisation:** KIT Department of Physics  
**Part of:** M-WIWI-104838 - Introduction to Natural Hazards and Risk Analysis

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<td>Each winter term</td>
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<td>Practice</td>
<td>2 SWS</td>
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Legend: 🖥 Online, 📦 Blended (On-Site/Online), 🗺️ On-Site, ☘️ Cancelled
**8.102 Course: Global Optimization I [T-WIWI-102726]**

**Responsible:** Prof. Dr. Oliver Stein  
**Organisation:** KIT Department of Economics and Management  
**Part of:**  
- M-WIWI-101413 - Applications of Operations Research  
- M-WIWI-101414 - Methodical Foundations of OR

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<td>Grade to a third</td>
<td>Each summer term</td>
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<td>Grade to a third</td>
<td>Each summer term</td>
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<td>Lecture</td>
<td>2 SWS</td>
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<td>Each summer term</td>
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**Legend:** 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✗ Cancelled

**Competence Certificate**

Success is in the form of a written examination (60 min.) (according to § 4(2), 1 SPO). The successful completion of the exercises is required for admission to the written exam.

The exam is offered in the lecture of semester and the following semester. The success check can be done also with the success control for “Global optimization II”. In this case, the duration of the written exam is 120 min.

**Prerequisites**

None

**Recommendation**

None

**Annotation**

Part I and II of the lecture are held consecutively in the same semester.

**Below you will find excerpts from events related to this course:**

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<th>Event</th>
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<td>Grade to a third</td>
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Content
In many optimization problems from economics, engineering and natural sciences, solution algorithms are only able to efficiently identify local optimizers, while it is much harder to find globally optimal points. This corresponds to the fact that by local search it is easy to find the summit of the closest mountain, but that the search for the summit of Mount Everest is rather elaborate.

The lecture treats methods for global optimization of convex functions under convex constraints. It is structured as follows:

- Introduction, examples, and terminology
- Existence results for optimal points
- Optimality in convex optimization
- Duality, bounds, and constraint qualifications
- Algorithms (Kelley’s cutting plane method, Frank-Wolfe method, primal-dual interior point methods)

The lecture is accompanied by exercises which, amongst others, offers the opportunity to implement and to test some of the methods on practically relevant examples.

Remark:
The treatment of nonconvex optimization problems forms the contents of the lecture "Global Optimization II". The lectures "Global Optimization I" and "Global Optimization II" are held consecutively in the same semester.

Learning objectives:
The student

- knows and understands the fundamentals of deterministic global optimization in the convex case,
- is able to choose, design and apply modern techniques of deterministic global optimization in the convex case in practice.

Literature

Weiterführende Literatur:
- W. Alt, Numerische Verfahren der konvexen, nichtglatten Optimierung, Teubner, 2004
- C.A. Floudas, Deterministic Global Optimization, Kluwer, 2000
8.103 Course: Global Optimization I and II [T-WIWI-103638]

**Responsible:** Prof. Dr. Oliver Stein  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101414 - Methodical Foundations of OR

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<td>Global Optimization I</td>
<td>2</td>
<td>Lecture</td>
<td>Stein</td>
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<td>Practice</td>
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**Exams**

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**Legend:** 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✗ Canceled

**Competence Certificate**
The assessment of the lecture is a written examination (120 minutes) according to §4(2), 1 of the examination regulation. The successful completion of the exercises is required for admission to the written exam.

The examination is held in the semester of the lecture and in the following semester.

**Prerequisites**
None

**Recommendation**
None

**Annotation**
Part I and II of the lecture are held consecutively in the same semester.

Below you will find excerpts from events related to this course:

**Global Optimization I**

2550134, SS 2023, 2 SWS, Language: German, [Open in study portal](#)
Content
In many optimization problems from economics, engineering and natural sciences, solution algorithms are only able to efficiently identify local optimizers, while it is much harder to find globally optimal points. This corresponds to the fact that by local search it is easy to find the summit of the closest mountain, but that the search for the summit of Mount Everest is rather elaborate.

The lecture treats methods for global optimization of convex functions under convex constraints. It is structured as follows:

- Introduction, examples, and terminology
- Existence results for optimal points
- Optimality in convex optimization
- Duality, bounds, and constraint qualifications
- Algorithms (Kelley’s cutting plane method, Frank-Wolfe method, primal-dual interior point methods)

The lecture is accompanied by exercises which, amongst others, offers the opportunity to implement and to test some of the methods on practically relevant examples.

Remark:
The treatment of nonconvex optimization problems forms the contents of the lecture "Global Optimization II". The lectures "Global Optimization I" and "Global Optimization II" are held consecutively in the same semester.

Learning objectives:
The student

- knows and understands the fundamentals of deterministic global optimization in the convex case,
- is able to choose, design and apply modern techniques of deterministic global optimization in the convex case in practice.

Literature

Weiterführende Literatur:
- W. Alt, Numerische Verfahren der konvexen, nichtglatten Optimierung, Teubner, 2004
- C.A. Floudas, Deterministic Global Optimization, Kluwer, 2000

Global Optimization II

2550136, SS 2023, 2 SWS, Language: German, Open in study portal

Content
In many optimization problems from economics, engineering and natural sciences, solution algorithms are only able to efficiently identify local optimizers, while it is much harder to find globally optimal points. This corresponds to the fact that by local search it is easy to find the summit of the closest mountain, but that the search for the summit of Mount Everest is rather elaborate.

The lecture treats methods for global optimization of nonconvex functions under nonconvex constraints. It is structured as follows:

- Introduction and examples
- Convex relaxation
- Interval arithmetic
- Convex relaxation via alphaBB method
- Branch-and-bound methods
- Lipschitz optimization

The lecture is accompanied by exercises which, amongst others, offers the opportunity to implement and to test some of the methods on practically relevant examples.

Remark:
The treatment of convex optimization problems forms the contents of the lecture "Global Optimization I". The lectures "Global Optimization I" and "Global Optimization II" are held consecutively in the same semester.

Learning objectives:
The student

- knows and understands the fundamentals of deterministic global optimization in the nonconvex case,
- is able to choose, design and apply modern techniques of deterministic global optimization in the nonconvex case in practice.
Literature

Weiterführende Literatur:

- W. Alt, Numerische Verfahren der konvexen, nichtglatten Optimierung, Teubner, 2004
- C.A. Floudas, Deterministic Global Optimization, Kluwer, 2000
8.104 Course: Global Optimization II [T-WIWI-102727]

**Responsible:** Prof. Dr. Oliver Stein

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-101414 - Methodical Foundations of OR

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**Events**

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Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣️ On-Site, ❌ Cancelled

**Competence Certificate**

The assessment of the lecture is a written examination (60 minutes) according to §4(2), 1 of the examination regulation. The successful completion of the exercises is required for admission to the written exam.

The examination is held in the semester of the lecture and in the following semester.

The examination can also be combined with the examination of “Global optimization I”. In this case, the duration of the written examination takes 120 minutes.

**Prerequisites**

None

**Annotation**

Part I and II of the lecture are held consecutively in the same semester.

*Below you will find excerpts from events related to this course:*

**Global Optimization II**

2550136, SS 2023, 2 SWS, Language: German, Open in study portal
Content
In many optimization problems from economics, engineering and natural sciences, solution algorithms are only able to efficiently identify local optimizers, while it is much harder to find globally optimal points. This corresponds to the fact that by local search it is easy to find the summit of the closest mountain, but that the search for the summit of Mount Everest is rather elaborate.

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- Convex relaxation via alphaBB method
- Branch-and-bound methods
- Lipschitz optimization

The lecture is accompanied by exercises which, amongst others, offers the opportunity to implement and to test some of the methods on practically relevant examples.

Remark:
The treatment of convex optimization problems forms the contents of the lecture "Global Optimization I". The lectures "Global Optimization I" and "Global Optimization II" are held consecutively in the same semester.

Learning objectives:
The student

- knows and understands the fundamentals of deterministic global optimization in the nonconvex case,
- is able to choose, design and apply modern techniques of deterministic global optimization in the nonconvex case in practice.

Literature

Weiterführende Literatur:
- W. Alt, Numerische Verfahren der konvexen, nichtglatten Optimierung, Teubner, 2004
- C.A. Floudas, Deterministic Global Optimization, Kluwer, 2000
8.05 Course: Global Production [T-MACH-110991]

**Responsible:** Prof. Dr.-Ing. Gisela Lanza  
**Organisation:** KIT Department of Mechanical Engineering  
**Part of:** M-MACH-106590 - Production Engineering

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**Legend:** 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ❌ Cancelled

**Competence Certificate**

Written Exam (60 min)

**Prerequisites**

T-MACH-108848 - Globale Produktion und Logistik - Teil 1: Globale Produktion must not be commenced.  
T-MACH-105158 - Globale Produktion und Logistik - Teil 1: Globale Produktion must not be commenced.  
T-MACH-110337 - Globale Produktion und Logistik must not be commenced.

**Recommendation**

Participation in “T-MACH-110981 - Tutorial Global Production” is recommended, but not mandatory.

*Below you will find excerpts from events related to this course:*

**Global Production**

2149613, WS 23/24, 2 SWS, Language: German, [Open in study portal](#)  
Lecture (V) Blended (On-Site/Online)
Content
The lecture examines the management of global production networks of manufacturing companies. It gives an overview of the influencing factors and challenges of global production. In-depth knowledge of common methods and procedures for planning, designing and managing global production networks is imparted.

Therefore, the lecture first of all discusses the connections and interdependencies between the business strategy and the production strategy and illustrates necessary tasks for the definition of a production strategy. Methods for site selection, for the site-specific adaptation of product design and production technology as well as for the establishment of new production sites and for the adaptation of existing production networks to changing framework conditions are subsequently taught within the context of the design of the network footprint. With regard to the management of global production networks, the lecture addresses challenges associated with coordination, procurement and order management in global networks. The lecture is complemented by a discussion on the use of industry 4.0 applications in global production and current trends in planning, designing and managing global production networks.

The topics include:

- Basic conditions and influencing factors of global production (historical development, targets, chances and threats)
- Framework for planning, designing and managing global production networks
- Production strategies for global production networks
  - From business strategy to production strategy
  - Tasks of the production strategy (product portfolio management, circular economy, planning of production depth, production-related research and development)
- Design of global production networks
  - Basic types of network structures
  - Planning process for the design of the network footprint
  - Adaptation of the network footprint
  - Site selection
  - Location-specific adaptation of production technology and product design
- Management of global production networks
  - Network coordination
  - Procurement process
  - Order management
- Trends in planning, designing and managing global production networks

Learning Outcomes:
The students ...

- can explain the general conditions and influencing factors of global production
- are capable to apply defined procedures for site selection and to evaluate site decisions with the help of different methods
- are able to select the adequate scope of design for site-appropriate production and product construction casespecifically
- can state the central elements in the planning process of establishing a new production site.
- are capable to make use of the methods to design and scale global production networks for company-individual problems
- are able to show up the challenges and potentials of the departments sales, procurement as well as research and development on global basis.

Workload:
regular attendance: 21 hours
self-study: 99 hours

Recommendations:
Combination with Global Production and Logistics – Part 2

Literature
Medien
Skript zur Veranstaltung wird über [https://ilias.studium.kit.edu/] bereitgestellt
empfohlene Sekundärliteratur:

Sekundärliteratur:

Media
Lecture notes will be provided in Ilias [https://ilias.studium.kit.edu/]
recommended secondary literature:
**8.106 Course: Großdiesel- und -gasmotoren für Schiffsantriebe [T-MACH-110816]**

**Responsible:** Dr.-Ing. Heiko Kubach

**Organisation:**
- Part of: M-MACH-101303 - Combustion Engines II

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### Events

| ST 2023   | 2134154 | Large Diesel and Gas Engines for Ship Propulsions | 2 SWS | Lecture / 🗣 | Weisser |

| ST 2023   | 76-T-MACH-110816 | Großdiesel- und -gasmotoren für Schiffsantriebe | Weisser |

Legend: 🖥 Online, 💼 Blended (On-Site/Online), 🗣 On-Site, 🗑 Cancelled

**Competence Certificate**
- oral exam, 20 minutes

**Prerequisites**
- None

Below you will find excerpts from events related to this course:

**Large Diesel and Gas Engines for Ship Propulsions**
2134154, SS 2023, 2 SWS, Language: German, [Open in study portal](#)

**Content**
- Introduction and History
- Types of Ships and Propulsion Systems
- Thermodynamic
- Boosting
- Design
- Fuels
- Lubricants
- Injection of liquid Fuels
- Combustions Processes for liquid Fuels
- Injection of Gaseous Fuels
- Combustion Processes for Gaseous Fuels
- Emissions
- Integration of Engines in Ships
- Large Engines in other Applications

**Organizational issues**
8.107 Course: Handling Characteristics of Motor Vehicles I [T-MACH-105152]

**Responsible:** Dr.-Ing. Hans-Joachim Unrau

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101264 - Handling Characteristics of Motor Vehicles

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**Events**

| WT 23/24 | 2113807 | Handling Characteristics of Motor Vehicles I | 2 SWS | Lecture / Online | Unrau |

**Exams**

| ST 2023    | 76-T-MACH-105152 | Handling Characteristics of Motor Vehicles I | Unrau |

| WT 23/24 | 76-T-MACH-105152 | Handling Characteristics of Motor Vehicles I | Unrau |

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

**Competence Certificate**

Verbally

**Duration:** 30 up to 40 minutes

**Auxiliary means:** none

**Prerequisites**

none

Below you will find excerpts from events related to this course:

Handling Characteristics of Motor Vehicles I

2113807, WS 23/24, 2 SWS, Language: German, Open in study portal

**Lecture (V) Online**

**Content**

1. Problem definition: Control loop driver - vehicle - environment (e.g. coordinate systems, modes of motion of the car body and the wheels)

2. Simulation models: Creation from motion equations (method according to D'Alembert, method according to Lagrange, programme packages for automatically producing of simulation equations), model for handling characteristics (task, motion equations)

3. Tyre behavior: Basics, dry, wet and winter-smooth roadway

**Learning Objectives:**

The students know the basic connections between drivers, vehicles and environment. They can build up a vehicle simulation model, with which forces of inertia, aerodynamic forces and tyre forces as well as the appropriate moments are considered. They have proper knowledge in the area of tyre characteristics, since a special meaning comes to the tire behavior during driving dynamics simulation. Consequently they are ready to analyze the most important influencing factors on the driving behaviour and to contribute to the optimization of the handling characteristics.

**Organizational issues**

Die Vorlesung wird als Videostream zur Verfügung gestellt. Sie finden den Videostream und das Vorlesungsmaterial auf ILIAS. Das ILIAS-Passwort erhalten Sie unter https://fast-web-01.fast.kit.edu/Passwoerterlias/
Literature
Course: Handling Characteristics of Motor Vehicles II [T-MACH-105153]

**Responsible:** Dr.-Ing. Hans-Joachim Unrau

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101264 - Handling Characteristics of Motor Vehicles

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**Events**

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**Legend:** 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✗ Cancelled

**Competence Certificate**

Oral Examination

Duration: 30 up to 40 minutes

Auxiliary means: none

**Prerequisites**

none

Below you will find excerpts from events related to this course:

**Handling Characteristics of Motor Vehicles II**

2114838, SS 2023, 2 SWS, Language: German, Open in study portal

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**Content**

1. Vehicle handling: Bases, steady state cornering, steering input step, single sine, double track switching, slalom, cross-wind behavior, uneven roadway

2. Stability behavior: Basics, stability conditions for single vehicles and for vehicles with trailer

**Learning Objectives:**

The students have an overview of common test methods, with which the handling of vehicles is gauged. They are able to interpret results of different stationary and transient testing methods. Apart from the methods, with which e.g. the driveability in curves or the transient behaviour from vehicles can be registered, also the influences from cross-wind and from uneven roadways on the handling characteristics are well known. They are familiar with the stability behavior from single vehicles and from vehicles with trailer. Consequently they are ready to judge the driving behaviour of vehicles and to change it by specific vehicle modifications.

**Literature**


**Responsible:** apl. Prof. Dr. Günter Schell

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101262 - Emphasis Materials Science

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**Exams**

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**Competence Certificate**
oral exam, 20-30 min

**Prerequisites**
none

Below you will find excerpts from events related to this course:

**Advanced powder metals**
2126749, SS 2023, 2 SWS, Language: German, [Open in study portal](#)

**Literature**

- R.M. German. "Powder metallurgy and particulate materials processing. Metal Powder Industries Federation, 2005
Course: Human Resource Management [T-WIWI-102909]

Responsible: Prof. Dr. Petra Nieken
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101513 - Human Resources and Organizations
M-WIWI-105928 - HR Management & Digital Workplace

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Exams

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Legend: 🖥 Online, 🛠 Blended (On-Site/Online), 🗣 On-Site, ✗ Cancelled

Competence Certificate
The assessment of this course is a written examination of 1 hour. The exam takes place in every semester. Re-examinations are offered at every ordinary examination date. In case of a small number of registrations, we might offer an oral exam instead of a written exam.

Prerequisites
None

Recommendation
Completion of module Business Administration is recommended. Basic knowledge of microeconomics, game theory, and statistics is recommended.

Below you will find excerpts from events related to this course:

Human Resource Management
2573005, WS 23/24, 2 SWS, Language: German, Open in study portal

Lecture (V) On-Site
Content
The students acquire basic knowledge in the fields of human resource planning, selection and talent management. Different processes and instruments and their link to corporate strategy are evaluated based on microeconomic and behavioral approaches. The results are tested and discussed based on empirical data.

Aim
The student

- understands the processes and instruments of human resource management.
- analyzes different methods of human resource planning and selection and evaluates their usefulness.
- analyzes different processes of talent management and evaluates the strengths and weaknesses.
- understands the challenges of human resource management and its link to corporate strategy.

Workload
The total workload for this course is approximately 135 hours.

Lecture: 32 hours
Preparation of lecture: 52 hours
Exam preparation: 51 hours

Literature

- Personnel Economics in Practice, Lazear & Gibbs, John Wiley & Sons, 2014
- Strategic Human Resources. Frameworks for General Managers, Baron & Kreps, John Wiley & Sons, 1999
### 8.111 Course: Hydraulic Engineering and Water Management [T-BGU-101667]

**Responsible:** Prof. Dr. Mario Jorge Rodrigues Pereira da Franca  
**Organisation:** KIT Department of Civil Engineering, Geo and Environmental Sciences  
**Part of:** M-WIWI-104838 - Introduction to Natural Hazards and Risk Analysis

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<td>WT 23/24 6200512</td>
<td>1 SWS</td>
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<td></td>
<td>Hydraulic Engineering and Water Management</td>
<td>Rodrigues Pereira da Franca</td>
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</tbody>
</table>

**Competence Certificate**  
written exam with 60 minutes

**Prerequisites**  
None

**Recommendation**  
None

**Annotation**  
None
8 COURSES

Course: Hydrogen and reFuels - Energy Conversion in Combustion Engines [T-MACH-111585]

Responsible: Dr.-Ing. Heiko Kubach
Organisation: KIT Department of Mechanical Engineering
Part of: M-MACH-101275 - Combustion Engines I

Type: Oral examination
Credits: 4
Grading scale: Grade to a third
Recurrence: Each winter term
Expansion: 1 terms
Version: 1

Events

<table>
<thead>
<tr>
<th>Events</th>
<th>Credits</th>
<th>Lecture Title</th>
<th>Credits</th>
<th>Lecture Type</th>
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<tr>
<td>WT 23/24</td>
<td>2 SWS</td>
<td>Hydrogen and reFuels - Energy Conversion in Combustion Engines</td>
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<td>Lecture</td>
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Exams

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<td>Hydrogen and reFuels - Energy Conversion in Combustion Engines</td>
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</table>

Competence Certificate
oral exam, appr. 25 minutes, no auxiliary means

Prerequisites
none

Below you will find excerpts from events related to this course:

V Hydrogen and reFuels - Energy Conversion in Combustion Engines
2134155, WS 23/24, 2 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Content
New types of CO2-neutral fuels such as gaseous hydrogen but also liquid synthetic fuels often place specific requirements on engine systems that differ significantly from operation with conventional fuels. These special aspects of engine energy conversion are dealt with in this lecture.

Introduction
Thermodynamics of combustion engines
Fundamentals
gas exchange
Flow field
Wall heat losses
Combustion in gasoline engines
Pressure Trace Analysis
Combustion in Diesel engines
Specific Topics of Hydrogen Combustion
Waste heat recovery
8.113 Course: Hydrology [T-BGU-101693]

**Responsible:** Prof. Dr.-Ing. Erwin Zehe

**Organisation:** KIT Department of Civil Engineering, Geo and Environmental Sciences

**Part of:** M-WIWI-104838 - Introduction to Natural Hazards and Risk Analysis

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<td>Lecture</td>
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<td>Zehe, Wienhöfer</td>
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<tr>
<td>Practice</td>
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<td>Hydrology</td>
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<td>Wienhöfer, Zehe</td>
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**Legend:** 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✗ Cancelled

**Prerequisites**
None

**Recommendation**
None

**Annotation**
None
8.114 Course: I4.0 Systems Platform [T-MACH-106457]

Responsible: Dipl.-Ing. Thomas Maier
Prof. Dr.-Ing. Jivka Ovtcharova

Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101270 - Product Lifecycle Management

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Exams

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<td>Each term</td>
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Competence Certificate
Alternative exam assessment (project work)

Prerequisites
None

Annotation
Limited number of participants.

Below you will find excerpts from events related to this course:

I4.0 Systems platform
2123900, SS 2023, 4 SWS, Language: German, Open in study portal

Content
Industry 4.0, IT systems for fabrication (e.g.: CAx, PDM, CAM, ERP, MES), process modelling and execution, project work in teams, practice-relevant I4.0 problems, in automation, manufacturing industry and service.

Students can
- describe the fundamental concepts, challenges, and objectives of Industrie 4.0 and name the essential terms in context of information management
- explain the necessary information flow between the different IT systems. They get practically knowledge about using current IT systems in context of I4.0, from order to production.
- map and analyze processes in the context of Industry 4.0 with special methods of process modelling
- collaboratively grasp practical I4.0 issues using existing hardware and software and work out solutions for a continuous improvement process in a team
- prototypically implement the self-developed solution proposal with the given IT systems and the existing hardware equipment and finally present the results

Literature
Keine / None

I4.0 Systems platform
2123900, WS 23/24, 4 SWS, Language: German, Open in study portal
Content
Industry 4.0, IT systems for fabrication (e.g.: CAx, PDM, CAM, ERP, MES), process modelling and execution, project work in teams, practice-relevant I4.0 problems, in automation, manufacturing industry and service.

Students can
- describe the fundamental concepts, challenges, and objectives of Industrie 4.0 and name the essential terms in context of information management
- explain the necessary information flow between the different IT systems. They get practically knowledge about using current IT systems in context of I4.0, from order to production.
- map and analyze processes in the context of Industry 4.0 with special methods of process modelling
- collaboratively grasp practical I4.0 issues using existing hardware and software and work out solutions for a continuous improvement process in a team
- prototypically implement the self-developed solution proposal with the given IT systems and the existing hardware equipment and finally present the results

Literature
Keine / None
8 COURSES
Course: Ignition Systems [T-MACH-105985]

8.115 Course: Ignition Systems [T-MACH-105985]

Responsible: Dr.-Ing. Olaf Toedter
Organisation: KIT Department of Mechanical Engineering
Part of: M-MACH-101303 - Combustion Engines II

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<td>Lecture / 🗣</td>
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<td>2 SWS</td>
<td>Lecture / 🗣</td>
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Competence Certificate
oral exam, 20 min

Prerequisites
none

Below you will find excerpts from events related to this course:

Ignition systems
2133125, WS 23/24, 2 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Content
- Ignition Process
- Spark Ignition
- Principle of Spark Ignition Systems
- Limits of Spark Ignition
- New Developments of Spark Ignition Systems
- New an Alternative Ignition Systems
**8.116 Course: Industrial Organization [T-WIWI-102844]**

**Responsible:** Prof. Dr. Johannes Philipp Reiß  
**Organisation:** KIT Department of Economics and Management  
**Part of:**  
- M-WIWI-101499 - Applied Microeconomics  
- M-WIWI-101501 - Economic Theory

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**Events**

| ST 2023 | 2560238 | Industrial Organization | 2 SWS | Lecture / 🗣 | Reiß, Peters |
| ST 2023 | 2560239 | Übung zu Industrieökonomie | 1 SWS | Practice / 🗣 | Peters, Reiß, Potarca |

**Exams**

| ST 2023 | 79100002 | Industrial Organization | Reiß |

**Legend:** 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, x Cancelled

**Competence Certificate**
The assessment consists of a written exam (60 minutes) (following §4(2), 1 of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

**Prerequisites**
None

**Recommendation**
Completion of the module Economics [WW1VWL] is assumed.

**Annotation**
This course is not given in summer 2017.

*Below you will find excerpts from events related to this course:*

**Industrial Organization**
2560238, SS 2023, 2 SWS, Language: German, Open in study portal

**Literature**

**Verpflichtende Literatur:**

**Ergänzende Literatur:**
8.117 Course: Information Engineering [T-MACH-102209]

**Responsible:** Prof. Dr.-Ing. Jivka Ovtcharova

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101270 - Product Lifecycle Management

<table>
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<td>Each term</td>
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**Events**

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<th>Recurrence</th>
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<td>Information Engineering</td>
<td>Seminar</td>
<td>Each term</td>
<td>Ovtcharova, Mitarbeiter</td>
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**Exams**

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<th>Credits</th>
<th>Type</th>
<th>Grading scale</th>
<th>Recurrence</th>
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<td>2 SWS</td>
<td>Information Engineering</td>
<td>Seminar</td>
<td>Each term</td>
</tr>
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</table>

**Competence Certificate**

Alternative exam assessment (written composition and speech)

**Prerequisites**

None

Below you will find excerpts from events related to this course:

**Information Engineering**

2122014, SS 2023, 2 SWS, Language: German/English, Open in study portal

**Content**

Seminar papers on current research topics of the Institute for Information Management in Engineering. The respective topics are presented at the beginning of each semester.

**Organizational issues**

Siehe ILIAS-Kurs

**Literature**

Themenspezifische Literatur
8.118 Course: Integrated Information Systems for Engineers [T-MACH-102083]

**Responsible:** Prof. Dr.-Ing. Jivka Ovtcharova  
**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101270 - Product Lifecycle Management

<table>
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<th>Recurrence</th>
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<td>Each summer term</td>
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**Events**

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<td>Lecture / Practice</td>
<td>3 SWS</td>
<td>Grade to a third</td>
<td>Each summer term</td>
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<td>Each summer term</td>
<td>On-Site</td>
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**Exams**

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<td>Integrated Information Systems for Engineers</td>
<td>Lecture / Practice</td>
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</table>

**Competence Certificate**  
Oral examination 20 min.

**Prerequisites**  
None

Below you will find excerpts from events related to this course:

**Integrated Information Systems for engineers**  
2121001, SS 2023, 3 SWS, Language: German, Open in study portal

**Content**

- Information systems, information management  
- CAD, CAP and CAM systems  
- PPS, ERP and PDM systems  
- Knowledge management and ontology  
- Process modeling

**Students can:**

- illustrate the structure and operating mode of information systems  
- describe the structure of relational databases  
- describe the fundamentals of knowledge management and its application in engineering and deploy ontology as knowledge representation  
- describe different types of process modelling and their application and illustrate and execute simple work flows and processes with selected tools  
- explain different goals of specific IT systems in product development (CAD, CAP, CAM, PPS, ERP, PDM) and assign product development processes

**Literature**

Vorlesungsfolien / lecture slides

**Integrated Information Systems for engineers**  
2121001, WS 23/24, 3 SWS, Language: German, Open in study portal

Lecture / Practice (VÜ)  
On-Site
Content

- Information systems, information management
- CAD, CAP and CAM systems
- PPS, ERP and PDM systems
- Knowledge management and ontology
- Process modeling

Students can:

- illustrate the structure and operating mode of information systems
- describe the structure of relational databases
- describe the fundamentals of knowledge management and its application in engineering and deploy ontology as knowledge representation
- describe different types of process modelling and their application and illustrate and execute simple work flows and processes with selected tools
- explain different goals of specific IT systems in product development (CAD, CAP, CAM, PPS, ERP, PDM) and assign product development processes

Literature

Vorlesungsfolien / lecture slides
Course: Integrated Production Planning in the Age of Industry 4.0 [T-MACH-109054]

**Responsible:** Prof. Dr.-Ing. Gisela Lanza

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101272 - Integrated Production Planning

**Type:** Written examination  
**Credits:** 9  
**Grading scale:** Grade to a third  
**Recurrence:** Each summer term  
**Version:** 1

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| **ST 2023** | 2150660 | Integrated Production Planning in the Age of Industry 4.0  
Lanza  
6 SWS  
Lecture / Practice / |
| **Exams** | | |
| **ST 2023** | 76-T-MACH-109054 | Integrated Production Planning in the Age of Industry 4.0  
Lanza  
Lanza  
Lanza  
Lanza |
| **WT 23/24** | 76-T-MACH-109054 | Integrated Production Planning in the Age of Industry 4.0  
Lanza  
Lanza  
Lanza  
Lanza |

**Competence Certificate**
Written Exam (120 min)

**Prerequisites**
"T-MACH-108849 - Integrierte Produktionsplanung im Zeitalter von Industrie 4.0" as well as "T-MACH-102106 Integrierte Produktionsplanung" must not be commenced.

Below you will find excerpts from events related to this course:

<table>
<thead>
<tr>
<th>Events</th>
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</table>
| **Integrated Production Planning in the Age of Industry 4.0** | 2150660, SS 2023, 6 SWS, Language: German, Open in study portal | Lecture / Practice (VÜ)  
On-Site |

Industrial Engineering and Management B.Sc.
Module Handbook as of 04/10/2023
Content
Integrated Production Planning in the age of Industry 4.0 will be taught in the context of this engineering science lecture. In addition to a comprehensive introduction to Industry 4.0, the following topics will be addressed at the beginning of the lecture:

- Basics, history and temporal development of production
- Integrated production planning and integrated digital engineering
- Principles of integrated production systems and further development with Industry 4.0

Building on this, the phases of integrated production planning are taught in accordance with VDI Guideline 5200, whereby special features of parts production and assembly are dealt with in the context of case studies:

- Factory planning system
- Definition of objectives
- Data collection and analysis
- Concept planning (structural development, structural dimensioning and rough layout)
- Detailed planning (PPS, process simulation as a validation tool, planning of conveyor technology and storage systems for linking production and IT systems in the I4.0 factory)
- Preparation and monitoring of implementation
- Start-up and series support

The lecture contents are complemented by numerous current practical examples with a strong Industry 4.0 reference. Aspects of sustainability are anchored in all units and thus basic knowledge of sustainable production planning is taught. Within the exercises the lecture contents are deepened and applied to specific problems and tasks.

Learning Outcomes:
The students ...

- can discuss basic questions of production technology.
- are able to apply the methods of integrated production planning to new problems.
- are able to analyze and evaluate the suitability of the methods, procedures and techniques for a specific problem.
- can apply the learned methods of integrated production planning to new problems.
- can use their knowledge targeted for efficient production technology.
- know the basic features of sustainable production planning and can apply underlying knowledge.

Workload:
MACH:
regular attendance: 63 hours
self-study: 177 hours

WING:
regular attendance: 63 hours
self-study: 207 hours

Organizational issues
Vorlesungstermine dienstags 14.00 Uhr und donnerstags 14.00 Uhr, Übungstermine donnerstags 15.45 Uhr. Bekanntgabe der konkreten Übungstermine erfolgt in der ersten Vorlesung

Literature
Medien:
Skript zur Veranstaltung wird über (https://ilias.studium.kit.edu/) bereitgestellt.

Media:
Lecture notes will be provided in Ilias (https://ilias.studium.kit.edu/).
Course: Integrative Strategies in Production and Development of High Performance Cars [T-MACH-105188]

**Responsible:** Karl-Hubert Schlichtenmayer

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-106590 - Production Engineering

<table>
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<td>Each summer term</td>
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**Events**

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<td>Lecture</td>
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**Exams**

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<tr>
<td>ST 2023</td>
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<td>Integrative Strategies in Production and Development of High Performance Cars</td>
<td>Lecture</td>
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<td>2 SWS</td>
<td>Integrative Strategies in Production and Development of High Performance Cars</td>
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**Legend:** 🖥 Online, 🧩 Blended (On-Site/Online), 👤 On-Site, ✗ Cancelled

**Competence Certificate**
Written Exam (60 min)

**Prerequisites**
none

*Below you will find excerpts from events related to this course:*

**Integrative Strategies in Production and Development of High Performance Cars**

2150601, SS 2023, 2 SWS, Language: German, [Open in study portal](#)
Content
The lecture deals with the technical and organizational aspects of integrated development and production of sports cars on the example of Porsche AG. The lecture begins with an introduction and discussion of social trends. The deepening of standardized development processes in the automotive practice and current development strategies follow. The management of complex development projects is a first focus of the lecture. The complex interlinkage between development, production and purchasing are a second focus. Methods of analysis of technological core competencies complement the lecture. The course is strongly oriented towards the practice and is provided with many current examples.

- Introduction to social trends towards high performance cars
- Automotive Production Processes
- Integrative R&D strategies and holistic capacity management
- Management of complex projects
- Interlinkage between R&D, production and purchasing
- The modern role of manufacturing from a R&D perspective
- Global R&D and production
- Methods to identify core competencies

Learning Outcomes:
The students ...

- are capable to specify the current technological and social challenges in automotive industry,
- are qualified to identify interlinkages between development processes and production systems.
- are able to explain challenges and solutions of global markets and global production of premium products.
- are able to explain modern methods to identify key competences of producing companies.

Workload:
regular attendance: 21 hours
self-study: 99 hours

Literature
Medien:
Skript zur Veranstaltung wird über (https://ilias.studium.kit.edu/) bereitgestellt.

Media:
Lecture notes will be provided in Ilias (https://ilias.studium.kit.edu/).
8.121 Course: International Finance [T-WIWI-102646]

Responsible: Prof. Dr. Marliese Uhrig-Homburg
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101402 - eFinance
        M-WIWI-101423 - Topics in Finance II
        M-WIWI-101465 - Topics in Finance I

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Events

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<th>International Finance</th>
<th>2 SWS</th>
<th>Lecture /</th>
<th>Walter, Uhrig-Homburg</th>
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Exams

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<td>International Finance</td>
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Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ❌ Cancelled

Competence Certificate

Depending on further pandemic developments, the examination will be offered either as a 60-minute written examination (written examination according to SPO § 4 Abs. 2, Pkt. 1) or as an open-book examination (alternative exam assessment according to SPO § 4 Abs. 2, Pkt. 3).

Prerequisites

None

Recommendation

None

Annotation

The course is offered as a 14-day or block course.

Below you will find excerpts from events related to this course:

International Finance
2530570, SS 2023, 2 SWS, Language: German, Open in study portal

Organizational issues

Kickoff am Mittwoch, 26.04.23, 15:45 - 19:00 Uhr im Raum 320 im Geb. 09.21 (Blücherstr. 17). Die Veranstaltung wird samstags als Blockveranstaltung angeboten, nach dem Kickoff nach Absprache.

Literature

Weiterführende Literatur:

8.122 Course: Internship [T-WIWI-102611]

- **Responsible:** Studiendekan des KIT-Studienganges
- **Organisation:** KIT Department of Economics and Management
- **Part of:** M-WIWI-101419 - Internship

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**Competence Certificate**
see module description

**Prerequisites**
Kein
8.123 Course: Introduction to Bionics [T-MACH-111807]

**Responsible:** apl. Prof. Dr. Hendrik Hölscher

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101287 - Microsystem Technology

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**Events**

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<td>ST 2023</td>
<td>2142151</td>
<td>Introduction to Biomimetics</td>
<td>Lecture</td>
<td>Hölscher, Greiner</td>
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<td>ST 2023</td>
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<td>Hölscher</td>
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<td>76-T-MACH-102172</td>
<td>Introduction into Biomimetics</td>
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<td>Hölscher</td>
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</table>

**Coment Certificate**

written exam (duration: 60 minutes)

**Prerequisites**

none

**Annotation**

Brick T-MACH-102172 may not be started

*Below you will find excerpts from events related to this course:*

**Introduction to Biomimetics**

2142151, SS 2023, 2 SWS, Language: German, [Open in study portal](#)

**Content**

Bionics focuses on the design of technical products following the example of nature. For this purpose we have to learn from nature and to understand its basic design rules. Therefore, the lecture focuses on the analysis of the fascinating effects used by many plants and animals. Possible implementations into technical products are discussed in the end.

The students should be able analyze, judge, plan and develop biomimetic strategies and products.

Basic knowledge in physics and chemistry

The successfull attendence of the lecture is controlled by a written examination.

**Organizational issues**

Die Vorlesung findet in Abhängigkeit von der aktuellen Situation in Präsenz statt. Im ILIAS werden Materialien (Videos, Originalliteratur, Übungen) zur Vertiefung zur Verfügung gestellt. Zusätzlich können zu den jeweiligen Vorlesungsterminen Aufgaben, Übungen und Fragen besprochen werden.

Diese Vorlesung ersetzt "Bionik für Ingenieure und Naturwissenschaftler" (nur der Titel hat sich geändert).

Für die schriftliche Klausur werden zwei Termine angeboten werden (voraussichtlich in der ersten Woche nach Vorlesungsende im Sommersemester und 1-2 Wochen vor Vorlesungsbeginn im Wintersemester).

**Literature**

Folien und Literatur werden in ILIAS zur Verfügung gestellt.
8.124 Course: Introduction to Ceramics [T-MACH-100287]

**Responsible:** Prof. Dr. Michael Hoffmann

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101262 - Emphasis Materials Science

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<th>Introduction to Ceramics</th>
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<th>Lecture / 🧩</th>
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**Exams**

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<td>Introduction to Ceramics</td>
<td>Schell, Bucharsky, Wagner</td>
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</table>

Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🔴 On-Site, ✗ Cancelled

**Competence Certificate**

The assessment consists of an oral exam (30 min) taking place at a specific date.

The re-examination is offered at a specific date.

**Prerequisites**

None

**Below you will find excerpts from events related to this course:**

**Introduction to Ceramics**

2125757, WS 23/24, 3 SWS, Language: German, Open in study portal

**Literature**

- Kingery, Bowen, Uhlmann, "Introduction To Ceramics", Wiley
- Y.-M. Chiang, D. Birnie III and W.D. Kingery, "Physical Ceramics", Wiley
- S.J.L. Kang, "Sintering, Densification, Grain Growth & Microstructure", Elsevier
8.125 Course: Introduction to Energy Economics [T-WIWI-102746]

Responsible: Prof. Dr. Wolf Fichtner
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101464 - Energy Economics

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<td>Introduction to Energy Economics</td>
<td>2 SWS</td>
<td>Lecture</td>
<td>Fichtner</td>
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<td>ST 2023</td>
<td>2581011</td>
<td>Übungen zu Einführung in die Energiewirtschaft</td>
<td>2 SWS</td>
<td>Practice</td>
<td>Lehmann, Sandmeier, Ardone, Fichtner</td>
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Exams

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<th>Type</th>
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</table>

Competence Certificate

The assessment consists of a written exam (90 minutes) (following §4(2) of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date. Depending on the respective pandemic situation, the exam may be offered as an open book exam (alternative exam assessment, following §4(2), 3 of the examination regulation).

Prerequisites

None.

Below you will find excerpts from events related to this course:

Introduction to Energy Economics
2581010, SS 2023, 2 SWS, Language: German, Open in study portal
Lecture (V) On-Site

Content

1. Introduction: terms, units, conversions
2. The energy carrier gas (reserves, resources, technologies)
3. The energy carrier oil (reserves, resources, technologies)
4. The energy carrier hard coal (reserves, resources, technologies)
5. The energy carrier lignite (reserves, resources, technologies)
6. The energy carrier uranium (reserves, resources, technologies)
7. The final carrier source electricity
8. The final carrier source heat
9. Other final energy carriers (cooling energy, hydrogen, compressed air)

The student is able to
- characterize and judge the different energy carriers and their peculiarities,
- understand contexts related to energy economics.

Literature

Weiterführende Literatur:
Feess, Eberhard. Umweltökonomie und Umweltpolitik. ISBN 3-8006-2187-8
8.126 Course: Introduction to Engineering Geology [T-BGU-101500]

**Responsible:** Prof. Dr. Philipp Blum  
**Organisation:** KIT Department of Civil Engineering, Geo and Environmental Sciences  
**Part of:** M-WIWI-104838 - Introduction to Natural Hazards and Risk Analysis

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**Events**

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<td>Blum, Fuchs</td>
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**Exams**

| ST 2023 | 8210_0100016 | Introduction to Engineering Geology | Blum |

**Prerequisites**

none

**Responsible:** Prof. Dr.-Ing. Alexander Fidlin

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101259 - Engineering Mechanics

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**Exams**

| ST 2023 76-T-MACH-102208-1 | Introduction to Engineering Mechanics I: Statics (75 Min) | Fidlin |
| ST 2023 76-T-MACH-102208-2 | Introduction to Engineering Mechanics I: Statics and Strength of Materials (120 Min) | Fidlin |

**Competence Certificate**

The assessment consists of a written examination (120 min) taking place in the recess period (according to Section 4(2), 1 of the examination regulation). The examination takes place in every semester. Re-examinations are offered at every ordinary examination date.

For students of economics the assessment consists of a written examination (Statics - 75 min.)

Permitted utilities: non-programmable calculator

**Prerequisites**

None

Below you will find excerpts from events related to this course:

**Introduction to Engineering Mechanics I: Statics and Strength of Materials**

2162238, SS 2023, 2 SWS, Language: German, Open in study portal

**Content**

Statics: force · moment · general equilibrium conditions · center of mass · inner force in structure · plane frameworks · theory of adhesion
8.128 Course: Introduction to Engineering Mechanics II : Dynamics [T-MACH-102210]

**Responsible:** Prof. Dr.-Ing. Alexander Fidlin

**Organisation:** KIT Department of Mechanical Engineering

**Part of:**
- M-MACH-101261 - Emphasis in Fundamentals of Engineering
- M-WIWI-101839 - Additional Fundamentals of Engineering

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**Competence Certificate**

The assessment consists of a written examination (75 min) taking place in the recess period (according to Section 4(2), 1 of the examination regulation). The examination is offered every semester. Re-examinations are offered at every ordinary examination date.

Permitted utilities: non-programmable calculator, literature.

**Prerequisites**

None

**Below you will find excerpts from events related to this course:**

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<th>Event</th>
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8.129 Course: Introduction to Finance and Accounting [T-WIWI-112820]

**Responsible:**
- Dr. Torsten Luedecke
- Prof. Dr. Martin Ruckes
- Dr. Jan-Oliver Strych
- Prof. Dr. Marliese Uhrig-Homburg
- Prof. Dr. Marcus Wouters

**Organisation:**
KIT Department of Economics and Management

**Part of:**
M-WIWI-105769 - Financing and Accounting

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<td>2 SWS</td>
<td>Tutorial</td>
<td>Wouters, Ruckes, Assistenten, Kohl</td>
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<td>ST 2023 2610026</td>
<td>Introduction to Finance and Accounting</td>
<td>2 SWS</td>
<td>Lecture / On-Site</td>
<td>Ruckes, Wouters, Thimme</td>
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**Exams**

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<td>WT 23/24 7900005</td>
<td>Financing and Accounting</td>
<td>Ruckes, Wouters, Luedecke</td>
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**Legend:**
- 🖥 Online
- 🧩 Blended (On-Site/Online)
- 🗣 On-Site
- ✗ Cancelled

**Competence Certificate**
Written Exam. The examination is offered at the beginning of each lecture-free period. Repeat examinations are possible at any regular examination date.

**Below you will find excerpts from events related to this course:**

**Introduction to Finance and Accounting**
2610026, SS 2023, 2 SWS, Language: German, Open in study portal

**Content**
The lecture covers the following topics:

- Investment and Finance
  - Valuation of Bonds and Stocks
  - Capital Budgeting
  - Portfolio Theory
- Financial Accounting
- Management Accounting

**Literature**
Ausführliche Literaturhinweise werden in den Materialen zur Vorlesung gegeben.
8.130 Course: Introduction to Game Theory [T-WIWI-102850]

**Responsible:** Prof. Dr. Clemens Puppe  
Prof. Dr. Johannes Philipp Reiß  

**Organisation:** KIT Department of Economics and Management  

**Part of:**  
M-WIWI-101499 - Applied Microeconomics  
M-WIWI-101501 - Economic Theory  

**Type**  
Written examination  

**Credits**  
4.5  

**Grading scale**  
Grade to a third  

**Recurrence**  
Each summer term  

**Version**  
3  

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**Events**

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<th>Introduction to Game Theory</th>
<th>2 SWS</th>
<th>Lecture / 🔴</th>
<th>Reiß, Potarca</th>
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<tbody>
<tr>
<td>ST 2023</td>
<td>2520526</td>
<td>Übungen zu Einführung in die Spieltheorie</td>
<td>1 SWS</td>
<td>Practice / 🔴</td>
<td>Peters, Reiß, Potarca</td>
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</table>

**Exams**

| ST 2023 | 79100001 | Introduction to Game Theory | | Reiß |

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

---

**Competence Certificate**

The assessment consists of a written exam (60 minutes) according to Section 4(2),1 of the examination regulation. The exam takes place in the recess period and can be repeated at every ordinary examination date.

**Recommendation**

Knowledge from the lecture "Economics I: Microeconomics" is recommended. Furthermore, basic knowledge of mathematics and statistics is assumed.

---

Below you will find excerpts from events related to this course:

**Introduction to Game Theory**

| 2520525, SS 2023, 2 SWS, Language: German, Open in study portal |
| Lecture (V) On-Site |

**Content**

The course focuses on non-cooperative game theory. It discusses models, solution concepts, and applications for simultaneous games as well as sequential games. Various solution concepts, e.g., Nash equilibrium and subgame-perfect equilibrium, are introduced along with more advanced concepts.

The assessment consists of a written exam (60 minutes) according to Section 4(2),1 of the examination regulation. The exam takes place in the recess period and can be resited at every ordinary examination date. Recommendation: You should have passed the module [M-WIWI-101398] Introduction to Economics.

**Recommendations:**

Basic knowledge of mathematics and statistics is assumed.

This course offers an introduction to the theoretical analysis of strategic interaction situations. At the end of the course, students shall be able to analyze situations of strategic interaction systematically and to use game theory to predict outcomes and give advice in applied economics settings.

**Compulsory textbook:**


**Additional Literature:**

Literature
Verpflichtende Literatur:

Ergänzende Literatur:
### 8.131 Course: Introduction to GIS for Students of Natural, Engineering and Geo Sciences [T-BGU-101681]

**Responsible:** Dr.-Ing. Sven Wursthorn  
**Organisation:** KIT Department of Civil Engineering, Geo and Environmental Sciences  
**Part of:** M-WIWI-104838 - Introduction to Natural Hazards and Risk Analysis

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<td>Wursthorn</td>
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</table>
8.132 Course: Introduction to GIS for Students of Natural, Engineering and Geo Sciences, Prerequisite [T-BGU-103541]

**Responsible:** Dr.-Ing. Sven Wursthorn

**Organisation:** KIT Department of Civil Engineering, Geo and Environmental Sciences

**Part of:** M-WIWI-104838 - Introduction to Natural Hazards and Risk Analysis

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**Competence Certificate**
The achievement control takes place via accepted exercises.

**Prerequisites**
none

**Recommendation**
none

**Annotation**
none
8 COURSES

Course: Introduction to Machine Learning [T-WIWI-111028]

8.133 Course: Introduction to Machine Learning [T-WIWI-111028]

Responsible:  Prof. Dr. Andreas Geyer-Schulz
Dr. Abdolreza Nazemi

Organisation:  KIT Department of Economics and Management

Part of:  M-WIWI-105482 - Machine Learning and Data Science

<table>
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Competence Certificate
Written examination (60 minutes) according to §4(2), 1 SPO. The exam is considered passed if at least 50 out of a maximum of 100 possible points are achieved. The grades are graded in five-point-steps (best grade 1.0 from 95 points). Details of the grade formation and scale will be announced in the course.

A bonus can be acquired through successful participation in the practice. If the grade of the written examination is between 4.0 and 1.3, the bonus improves the grade by one grade level (0.3 or 0.4). The exact criteria for awarding a bonus will be announced at the beginning of the course.

Below you will find excerpts from events related to this course:

**Introduction to Machine Learning**
2540539, WS 23/24, 2 SWS, Language: English, [Open in study portal](#)

Lecture (V) On-Site

**Content**
- Introduction
- Data Cleaning
- Data Visualization
- Linear Regression
- Logistic Regression
- Tree-based Algorithms
- Support Vector Machine
- Shrinkage Models
- Dimensionality Reduction
- Clustering

**Literature**
- James, G., Witten, D., Hastie, T., and R. Tibshirani (2013). *An Introduction to Statistical Learning: with Applications in R*. Springer.
8.134 Course: Introduction to Microsystem Technology I [T-MACH-105182]

Responsible: Dr. Vlad Badilita
Dr. Mazin Jouda
Prof. Dr. Jan Gerrit Korvink

Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101287 - Microsystem Technology

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Legend: • Online, § Blended (On-Site/Online), ⬆ On-Site, ✗ Cancelled

Competence Certificate
written examination (60 min)

Prerequisites
none

Below you will find excerpts from events related to this course:

Introduction to Microsystem Technology I
2141861, WS 23/24, 2 SWS, Language: English, Open in study portal
Lecture (V) On-Site

Literature
Mikrosystemtechnik für Ingenieure, W. Menz und J. Mohr, VCH Verlagsgesellschaft, Weinheim 2005
M. Madou
Fundamentals of Microfabrication
Taylor & Francis Ltd.; Auflage: 3. Auflage. 2011
8.135 Course: Introduction to Microsystem Technology II [T-MACH-105183]

**Responsible:** Dr. Mazin Jouda
Prof. Dr. Jan Gerrit Korvink

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101287 - Microsystem Technology

**Type**
- Written examination

**Credits**
- 3

**Grading scale**
- Grade to a third

**Recurrence**
- Each summer term

**Version**
- 1

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**Events**

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**Exams**

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**Legend:** 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✗ Cancelled

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**Competence Certificate**

written examination (60 min)

**Prerequisites**

none

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Below you will find excerpts from events related to this course:

### Content

- Introduction in Nano- and Microtechnologies
- Lithography
- LIGA-technique
- Mechanical microfabrication
- Patterning with lasers
- Assembly and packaging
- Microsystems

**Organizational issues**

**Topic:** Grundlagen der Mikrosystemtechnik II (MST II) SS 21

**Time:** Thursdays 14:00 - 15:30

10.91 Redtenbacher-Hörsaal

**Literature**

Menz, W., Mohr, J., O. Paul: Mikrosystemtechnik für Ingenieure, VCH-Verlag, Weinheim, 2005

M. Madou
Fundamentals of Microfabrication
Taylor & Francis Ltd.; Auflage: 3. Auflage. 2011

---

Industrial Engineering and Management B.Sc.
Module Handbook as of 04/10/2023

327
8.136 Course: Introduction to Neural Networks and Genetic Algorithms [T-WIWI-111029]

**Responsible:** Prof. Dr. Andreas Geyer-Schulz

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-105482 - Machine Learning and Data Science

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**Competence Certificate**

Written examination (60 minutes) according to §4(2), 1 SPO. The exam is considered passed if at least 50 out of a maximum of 100 possible points are achieved. The grades are graded in five-point-steps (best grade 1.0 from 95 points). Details of the grade formation and scale will be announced in the course.

A bonus can be acquired through successful participation in the practice. If the grade of the written examination is between 4.0 and 1.3, the bonus improves the grade by one grade level (0.3 or 0.4). The exact criteria for awarding a bonus will be announced at the beginning of the course.

Below you will find excerpts from events related to this course:

**Introduction to Neural Networks and Genetic Algorithms (SoSe 2023)**

**Content**

The course consists of a short introduction and two parts:

1. In the introduction, the biological mechanisms of neural and genetic methods are presented. Furthermore, a common framework for the learning performance evaluation of these methods in applications is introduced.
2. In the field of genetic methods, simple genetic algorithms and their variants are introduced, analyzed, and applied.
3. In the area of neural methods, the basic algorithms are presented (e.g., backpropagation) as well as their applications in data science.

**Learning Objectives:**

The student knows the essential algorithms, learning procedures, and methods for neural networks and genetic algorithms. They can apply these methods (e.g. in R) and evaluate their quality.

**Literature**

8.137 Course: Introduction to Operations Research I and II [T-WIWI-102758]

**Responsible:** Prof. Dr. Stefan Nickel  
Prof. Dr. Steffen Rebennack  
Prof. Dr. Oliver Stein

**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101418 - Introduction to Operations Research

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**Exams**

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**Competence Certificate**

The assessment of the module is carried out by a written examination (120 minutes) according to Section 4(2), 1 of the examination regulation. In each term (usually in March and August), one examination is held for both courses. The overall grade of the module is the grade of the written examination.

**Prerequisites**

None

**Recommendation**

Knowledge of Mathematics I and II is recommended, as well as programming knowledge for the software laboratory. It is strongly recommended to attend the course Introduction to Operations Research I [2550040] before attending the course Introduction to Operations Research II [2530043].

*Below you will find excerpts from events related to this course:*

**Introduction to Operations Research I**

2550040, SS 2023, 2 SWS, Language: German, Open in study portal

**Lecture (V)**

Blended (On-Site/Online)
Content
Examples for typical OR problems.

Linear Programming: Basic notions, simplex method, duality, special versions of the simplex method (dual simplex method, three phase method), sensitivity analysis, parametric optimization, game theory.

Graphs and Networks: Basic notions of graph theory, shortest paths in networks, project scheduling, maximal and minimal cost flows in networks.

Learning objectives:
The student

- names and describes basic notions of linear programming as well as graphs and networks,
- knows the indispensable methods and models for quantitative analysis,
- models and classifies optimization problems and chooses the appropriate solution methods to solve optimization problems independently,
- validates, illustrates and interprets the obtained solutions.

Literature

### 8.138 Course: Introduction to Programming with Java [T-WIWI-102735]

**Responsible:** Prof. Dr.-Ing. Johann Marius Zöllner  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101581 - Introduction to Programming

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**Competence Certificate**

The assessment consists of a written resp. computer-based exam (60 min) according to Section 4 (2),1 of the examination regulation.

The successful completion of the compulsory tests in the computer lab is prerequisite for admission to the written resp. computer-based exam.

The examination takes place every semester. Re-examinations are offered at every ordinary examination date.

**Annotation**

see german version

---

**Below you will find excerpts from events related to this course:**

### Introduction to Programming with Java

**2511000, WS 23/24, 3 SWS, Language: German, Open in study portal**

**Lecture (V) On-Site**

**Content**

The lecture “Introduction to Programming with Java” introduces systematic programming and provides essential practical basics for all advanced computer science lectures.

Based on considerations of the structured and systematic design of algorithms, the most important constructs of modern higher programming languages as well as programming methods are explained and illustrated with examples. One focus of the lecture is on teaching the concepts of object-oriented Programming. Java is used as the programming language. Knowledge of this language is required in advanced computer science lectures.

At the end of the lecture period, a written examination will be held for which admission must be granted during the semester after successful participation in the practices. The exact details will be announced in the lecture.

**Learning objectives:**

- Knowledge of the fundamentals, methods and systems of computer science.
- The students acquire the ability to independently solve algorithmic problems in the programming language Java, which dominates in business applications.
- In doing so, they will be able to find strategic and creative answers in finding solutions to well-defined, concrete and abstract problems.

**Workload:**

The total workload for this course is approximately 150 hours. For further information see German version.
Literature
8.139 Course: Introduction to Public Finance [T-WIWI-102877]

 Responsible: Prof. Dr. Berthold Wigger
 Organisation: KIT Department of Economics and Management
 Part of: M-WIWI-101403 - Public Finance

<table>
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Events

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Exams

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Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate
Depending on the further pandemic development the assessment will consist either of an open book exam (following Art. 4, para. 2, clause 3 of the examination regulation), or of an 1h written exam (following Art. 4, para. 2, clause 1 of the examination regulation).

Prerequisites
None

Below you will find excerpts from events related to this course:

Introduction to Public Finance
2560131, WS 23/24, 3 SWS, Language: German, Open in study portal
Lecture (V)
Blended (On-Site/Online)

Content
The course Introduction to Public Finance provides an overview of the fundamental issues in public economics. The first part of the course deals with normative theories about the economic role of the state in a market economy. Welfare economics theory is offered as a base model, with which alternative normative theories are compared and contrasted. Within this theoretical framework, arguments concerning efficiency and equity are developed as justification for varying degrees of economic intervention by the state. The second part of the course deals with the positivist theory of public economics. Processes of public decision making are examined and the conditions that lead to market failures resulting from collective action problems are discussed. The third part of the course examines a variety of public spending programs, including social security systems, the public education system, and programs aimed at reducing poverty. The fifth part of the course addresses the key theoretical and political issues associated with fiscal federalism.

Learning goals:
Students are able to:

- critically assess the economic role of the state in a market economy
- explain and discuss key concepts in public finance, including: public goods; economic externalities; and market failure
- explain and critically discuss competing theoretical approaches to public finance, including welfare economics and public choice theory
- explain the theory of bureaucracy according to Weber and critically assess its strengths and weaknesses
- evaluate the incentives inherent in the bureaucratic model, as well as the more recent introduction of market-oriented incentives associated with public-sector reform

Workload:
The total workload for this course is approximately 135.0 hours. For further information see German version.

Literature
Literatur:
8 COURSES

Course: Introduction to Stochastic Optimization [T-WIWI-106546]

8.140 Course: Introduction to Stochastic Optimization [T-WIWI-106546]

Responsible: Prof. Dr. Steffen Rebennack
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101414 - Methodical Foundations of OR
M-WIWI-103278 - Optimization under Uncertainty

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Exams

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<td>Introduction to Stochastic Optimization</td>
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Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✗ Cancelled

Competence Certificate
The assessment consists of a written exam (60 minutes). The exam takes place in every semester.

Prerequisites
None.
8.141 Course: Investments [T-WIWI-102604]

**Responsible:** Prof. Dr. Marliese Uhrig-Homburg  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101435 - Essentials of Finance

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**Exams**

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</table>

**Competence Certificate**

Depending on further pandemic developments, the examination will be offered either as a 60-minute written examination or as an open-book examination (alternative exam assessment).

A bonus can be earned by correctly solving at least 50% of the posed bonus exercises. If the grade of the written examination is between 4.0 and 1.3, the bonus improves the grade by up to one grade level (0.3 or 0.4). Details will be announced in the lecture.

**Prerequisites**

None

**Recommendation**

Knowledge of Business Administration: Finance and Accounting [2610026] is recommended.

**Below you will find excerpts from events related to this course:**

**Investments**

2530575, SS 2023, 2 SWS, Language: German, [Open in study portal]

**Literature**

*Weiterführende Literatur:*

8.142 Course: Laboratory Production Metrology [T-MACH-108878]

**Responsible:** Prof. Dr.-Ing. Gisela Lanza
Dr. Florian Stamer

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-106590 - Production Engineering

<table>
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**Events**

| ST 2023 | 2150550 | Laboratory Production Metrology | 3 SWS | Practical course / 🗣 | Lanza, Stamer |

**Exams**

| ST 2023 | 76-T-MACH-108878 | Laboratory Production Metrology | Lanza, Stamer |

**Competence Certificate**
Alternative Test Achievement: Group presentation of 15 min at the beginning of each experiment and evaluation of the participation during the experiments and Oral Exam (15 min)

**Prerequisites**
one

**Annotation**
For organizational reasons the number of participants for the course is limited. Hence a selection process will take place. Applications are made via the homepage of wbk (http://www.wbk.kit.edu/studium-und-lehre.php).

*Below you will find excerpts from events related to this course:*
Content
During this course, students get to know measurement systems that are used in a production system. In the age of Industry 4.0, sensors are becoming more important. Therefore, the application of in-line measurement technology such as machine vision and non-destructive testing is focussed. Additionally, laboratory based measurement technologies such as computed tomography are addressed. The students learn the theoretical background as well as practical applications for industrial examples. The students use sensors by themselves during the course. Additionally, they are trained on how to integrate sensors in production processes and how to analyze measurement data with suitable software.

The following topics are addressed:

- Classification and examples for different measurement technologies in a production environment
- Machine vision with optical sensors
- Information fusion based on optical measurements
- Robot-based optical measurements
- Non-destructive testing by means of acoustic measurements
- Coordinate measurement technology
- Industrial computed tomography
- Measurement uncertainty evaluation
- Analysis of production data by means of data mining

Learning Outcomes:
The students ...

- are able to name, describe and mark out different measurement technologies that are relevant in a production environment.
- are able to conduct measurements with the presented in-line and laboratory based measurement systems.
- are able to analyze measurement results and asses the measurement uncertainty of these.
- are able to deduce whether a work piece fulfills quality relevant specifications by analysing measurement results.
- are able to use the presented measurement technologies for a new task.

Workload:
regular attendance: 31.5 hours
self-study: 88.5 hours

Organizational issues

For organizational reasons the number of participants for the course is limited. Hence an selection process will take place. Applications are made via the homepage of wbk (http://www.wbk.kit.edu/studium-und-lehre.php).

Literature
Skript zur Veranstaltung wird über (https://ilias.studium.kit.edu/) bereitgestellt. Ebenso wird auf gängie Fachliteratur verwiesen.

Lecture notes will be provided in Ilias (https://ilias.studium.kit.edu/). Additional reference to literature will be provided, as well.
8.143 Course: Learning Factory "Global Production“ [T-MACH-105783]

Responsible: Prof. Dr.-Ing. Gisela Lanza
Organisation: KIT Department of Mechanical Engineering
Part of: M-MACH-106590 - Production Engineering

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<td>/ 🧩</td>
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Exams

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</table>

Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✗ Cancelled

Competence Certificate
Alternative test achievement (graded):
- Knowledge acquisition in the context of the seminar (4 achievements 20 min each) with weighting 40%.
- Interaction between participants with weighting 15%.
- Scientific colloquium (in groups of 3 students approx. 45 min each) with weighting 45%.

Prerequisites
none

Annotation
For organisational reasons, the number of participants for the course is limited to 20. As a result, a selection process will take place. Applications must be submitted via the wbk homepage (http://www.wbk.kit.edu/lernfabrik.php).
Due to the limited number of participants, advance registration is required.
Students should have previous knowledge in at least one of the following areas:
- Integrated Production Planning
- Global Production and Logistics
- Quality Management

Below you will find excerpts from events related to this course:
Content

The learning factory "Global Production" serves as a modern teaching environment for the challenges of global production. To make these challenges come alive, students can run a production of electric motors under real production conditions. The course is divided into e-learning units and presence dates. The e-learning units help to learn essential basics and to immerse themselves in specific topics (e.g. selection of location, supplier selection and planning of production networks). The focus of the presence appointments is the case-specific application of relevant methods for planning and control of production systems that are suitable for the location. In addition to traditional methods and tools to organize lean production systems (e.g. Kanban and JIT/ JIS, Line Balancing) the lecture in particular deals with site-specific quality assurance and scalable automation. Essential methods for quality assurance in complex production systems are taught and brought to practical experience by a Six Sigma project. In the area of scalable automation, it is important to find solutions for the adaption of the level of automation of the production system to the local production conditions (e.g. automated workpiece transport, integration of lightweight robots for process linking) and to implement them physically. At the same time safety concepts should be developed and implemented as enablers for human-robot collaboration.

The course also includes an excursion to the production plant for the manufacturing of electric motors of an industrial partner.

Main focus of the lecture:

- site selection
- site-specific factory planning
- site-specific quality assurance
- scalable automation
- supplier selection

Learning Outcomes:

The students are able to ...

- evaluate and select alternative locations using appropriate methods.
- use methods and tools of lean management to plan and manage production systems that are suitable for the location.
- use the Six Sigma method and apply goal-oriented process management.
- select an appropriate level of automation of the production units based on quantitative variables.
- make use of well-established methods for the evaluation and selection of suppliers.
- apply methods for planning a global production network depending on company-specific circumstances to sketch a suitable network and classify and evaluating it according to specific criteria.
- apply the learned methods and approaches with regard to problem solving in a global production environment and able to reflect their effectiveness.

Workload:

e-Learning: ~ 24 h
regular attendance: ~ 36 h
self-study: ~ 60 h

Organizational issues

Terminen werden über die Institutshomepage bekanntgegeben.

Aus organisatorischen Gründen ist die Teilnehmerzahl für die Lehrveranstaltung auf 20 Teilnehmer begrenzt. Infolgedessen wird ein Auswahlprozess stattfinden. Die Bewerbung erfolgt über die Homepage des wbk (http://www.wbk.kit.edu/studium-und-lehre.php)

Aufgrund der begrenzten Teilnehmerzahl ist eine Voranmeldung erforderlich.

Die Studierenden sollten Vorkenntnisse in mindestens einem der folgenden Bereiche haben:

- Integrierte Produktion/planung
- Globale Produktion und Logistik
- Qualitätsmanagement

For organisational reasons, the number of participants for the course is limited to 20. As a result, a selection process will take place. Applications must be submitted via the wbk homepage (http://www.wbk.kit.edu/studium-und-lehre.php).

Due to the limited number of participants, advance registration is required.

Students should have previous knowledge in at least one of the following areas:

- Integrated Production Planning
- Global Production and Logistics
- Quality Management
Literature
Media:

Media:
E-learning platform ilias, powerpoint, photo protocol. The media are provided through ilias (https://ilias.studium.kit.edu/).
8.144 Course: Logistics and Supply Chain Management [T-MACH-110771]

- **Responsible:** Prof. Dr.-Ing. Kai Furmans
- **Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-105298 - Logistics and Supply Chain Management

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**Exams**

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**Competence Certificate**

The success control takes place in the form of an examination performance of a different kind. This is composed as follows:

- 50% assessment of a written examination (60 min) during the semester break
- 50% assessment of an oral examination (20 min) during the semester break

To pass the examination, both examination performances must be passed.

**Prerequisites**

The course T-WIWI-102870 "Logistics and Supply Chain Management" must not have been selected.

**Annotation**

The brick cannot be taken if one of the bricks "T-MACH-102089 - Logistics - Organisation, Design and Control of Logistic Systems" and "T-MACH-105181 - Supply Chain Management" has been taken.

Below you will find excerpts from events related to this course:

**Content**

In the lecture "Logistics and Supply Chain Management", comprehensive and well-founded fundamentals of crucial issues in logistics and supply chain management are presented. Furthermore, the interaction of different design elements of supply chains is emphasized. For this purpose, both qualitative and quantitative models are presented and applied. Additionally, methods for mapping and evaluating logistics systems and supply chains are described. The contents of the lecture are deepened in exercises and case studies and comprehension is partially reviewed in case studies. The contents will be illustrated, among other things, on the basis of supply chains in the automotive industry.

Among others, the following topics are covered:

- Inventory Management
- Forecasting
- Bullwhip Effect
- Supply Chain Segmentation and Collaboration
- Key Performance Indicators
- Supply Chain Risk Management
- Production Logistics
- Location Planning
- Route Planning

It is intended to provide an interactive format in which students can also contribute (and work alone or in groups). Since logistics and supply chain management (also in times during and after Corona) requires working in an international environment and therefore many terms are derived from English, the lecture will be held in English.
### 8.145 Course: Logistics and Supply Chain Management [T-WIWI-102870]

**Responsible:** Prof. Dr. Frank Schultmann  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101437 - Industrial Production I

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**Exams**

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**Legend:**  
🖥 Online  
🧩 Blended (On-Site/Online)  
🗣 On-Site  
🗙 Cancelled

**Competence Certificate**

The assessment consists of an oral (30 minutes) or written exam (60 minutes) (following §4(2) of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date. Depending on the respective pandemic situation, the exam may be offered as an open book exam (alternative exam assessment, following §4(2), 3 of the examination regulation).

**Modeled Conditions**

The following conditions have to be fulfilled:

1. The course T-MACH-110771 - Logistics and Supply Chain Management must not have been started.

**Below you will find excerpts from events related to this course:**

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<td>2 SWS</td>
<td>Lecture</td>
<td>Grade to a third</td>
<td>Schultmann</td>
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</table>

**Content**

Students are introduced to the methods and tools of logistics and supply chain management. They learn the key terms and components of supply chains together with key economic trade-offs. In detail, students gain knowledge of decisions in supply chain management, such as facility location, supply chain planning, inventory management, pricing and supply chain cooperation. In this manner, students will gain knowledge in analyzing, designing and steering of decisions in the domain of logistics and supply chain management.

- Introduction: Basic terms and concepts
- Facility location and network optimization
- Supply chain planning I: flexibility
- Supply chain planning II: forecasting
- Inventory management & pricing
- Supply chain coordination I: the Bullwhip-effect
- Supply chain coordination II: double marginalization
- Supply chain risk management

**Literature**

Wird in der Veranstaltung bekannt gegeben.
8.146 Course: Machine Tools and High-Precision Manufacturing Systems [T-MACH-110963]

Responsibility: Prof. Dr.-Ing. Jürgen Fleischer
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101286 - Machine Tools and Industrial Handling

<table>
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Events

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<th>6 SWS</th>
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Competence Certificate
Oral exam (approx. 45 minutes)

Prerequisites
T-MACH-102158 - Machine Tools and Industrial Handling must not be commenced.
T-MACH-109055 - Machine Tools and Industrial Handling must not be commenced.
T-MACH-110962 - Machine Tools and High-Precision Manufacturing Systems must not be commenced.

Below you will find excerpts from events related to this course:
Content
The lecture gives an overview of the construction, use and application of machine tools and high-precision manufacturing systems. In the course of the lecture a well-founded and practice-oriented knowledge for the selection, design and evaluation of machine tools and high-precision manufacturing systems is conveyed. First, the main components of the systems are systematically explained and their design principles as well as the integral system design are discussed. Subsequently, the use and application of machine tools and high-precision manufacturing systems will be demonstrated using typical machine examples. Based on examples from current research and industrial applications, the latest developments are discussed, especially concerning the implementation of Industry 4.0 and artificial intelligence. Guest lectures from industry round off the lecture with insights into practice.

The individual topics are:

- Structural components of dynamic manufacturing Systems
- Feed axes: High-precision positioning
- Spindles of cutting machine Tools
- Peripheral Equipment
- Machine control unit
- Metrological Evaluation
- Maintenance strategies and condition Monitoring
- Process Monitoring
- Development process for machine tools and high-precision manufacturing Systems
- Machine examples

Learning Outcomes:
The students ...

- are able to assess the use and application of machine tools and high-precision manufacturing systems and to differentiate between them in terms of their characteristics and design.
- can describe and discuss the essential elements of machine tools and high-precision manufacturing systems (frame, main spindle, feed axes, peripheral equipment, control unit).
- are able to select and dimension the essential components of machine tools and high-precision manufacturing systems.
- are capable of selecting and evaluating machine tools and high-precision manufacturing systems according to technical and economic criteria.

Workload:
MACH:
regular attendance: 63 hours
self-study: 177 hours
WING/TVWL:
regular attendance: 63 hours
self-study: 207 hours

Organizational issues

Zur Vertiefung des im Rahmen der Lehrveranstaltung erworbenen Wissens werden die theoretischen Vorlesungseinheiten durch Praxiserfahrungen im Umfeld der Karlsruher Forschungsfabrik unterstützt. The theoretical lectures are complemented by practical lectures in the Karlsruhe Research Factory to deepen the acquired knowledge.

Literature
Medien:
Skript zur Veranstaltung wird über Ilias bereitgestellt.

Media:
Lecture notes will be provided in Ilias.
8.147 Course: Macroeconomic Theory [T-WIWI-109121]

**Responsible:** Prof. Dr. Johannes Brumm

**Organisation:** KIT Department of Economics and Management

**Part of:**
- M-WIWI-101501 - Economic Theory
- M-WIWI-101668 - Economic Policy I
- M-WIWI-106472 - Advanced Macroeconomics

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**Competence Certificate**
The assessment consists of a written exam (60 min.) according to § 4 paragraph 2 Nr. 1 of the examination regulation.

**Prerequisites**
None.

**Below you will find excerpts from events related to this course:**

### Macroeconomic Theory

**2560404, WS 23/24, 2 SWS, Language: English, Open in study portal**

**Lecture (V)**

**On-Site**

**Content**
This course introduces a modern approach to macroeconomics by building on microeconomic principles. To be able to rigorously address key macroeconomic questions a general framework based on intertemporal decision making is introduced. Starting by the principles of consumer and firm behavior, this framework is successively expanded by introducing market imperfections, monetary factors as well as international trade. With this framework at hand students are able to analyze labor market policies, government deficits, monetary policy, trade policy, and other important macroeconomic problems. Throughout the course, we not only point out the power of theory but also its limitations.

**Literature**

Literatur und Skripte werden in der Veranstaltung angegeben.
8.148 Course: Management Accounting 1 [T-WIWI-102800]

**Responsible:** Prof. Dr. Marcus Wouters  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101498 - Management Accounting

<table>
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**Events**

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**Exams**

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**Legend:** 🖥 Online, 🧩 Blended (On-Site/Online), 📋 On-Site, ✗ Cancelled

**Competence Certificate**
The assessment consists of a written exam (120 min.) according to § 4 paragraph 2 Nr. 1 of the examination regulation.

**Recommendation**
We recommend that you take part in our exercise for the lecture.

**Annotation**
The exercise is offered separately for Bachelor's students as well as for students in the Master's transfer and Master's program.

Note for exam registration:
- Bachelor students: 79-2579900-B Management Accounting 1 (Bachelor)
- Students in the Master's transfer and Master's program: 79-2579900-M Management Accounting 1 (Master’s transfer and Master)

Below you will find excerpts from events related to this course:

**Management Accounting 1**
2579900, SS 2023, 2 SWS, Language: English, [Open in study portal](#)
Content
The course covers topics in management accounting in a decision-making framework. Some of these topics in the course MA1 are: short-term planning, investment decisions, budgeting and activity-based costing.

We will use international material written in English.

We will approach these topics primarily from the perspective of the users of financial information (not so much from the controller who prepares the information).

The course builds on an introductory level of understanding of accounting concepts from Business Administration courses in the core program. The course is intended for students in Industrial Engineering.

Learning objectives:
- Students have an understanding of theory and applications of management accounting topics.
- They can use financial information for various purposes in organizations.

Examination:
- The assessment consists of a written exam (120 minutes) at the end of each semester (following § 4 (2) No. 1 of the examination regulation).

Workload:
- The total workload for this course is approximately 135.0 hours. For further information see German version.

Literature
- In addition, several papers that will be available on ILIAS.
8 COURSES

8.149 Course: Management Accounting 2 [T-WIWI-102801]

Responsible: Prof. Dr. Marcus Wouters
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101498 - Management Accounting

<table>
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Exams

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Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ❌ Canceled

Competence Certificate

The assessment consists of a written exam (120 min.) according to § 4 paragraph 2 Nr. 1 of the examination regulation.

Prerequisites

None

Recommendation

It is recommended:

- to take part in the course "Management Accounting 1" before this course
- participation in the exercise for the lecture "Management Accounting 2"

Annotation

The exercise for the lecture is offered separately for Bachelor's students as well as for students in the Master's transfer and Master's program.

Note for exam registration: Bachelor students:

- 79-2579903-B Management Accounting 2 (Bachelor)
- Students in the Master's transfer and Master's program: 79-2579903-M Management Accounting 2 (Master's transfer and Master)

Below you will find excerpts from events related to this course:
**Content**
The course covers topics in management accounting in a decision-making framework. Some of these topics in the course MA2 are: cost estimation, product costing and cost allocation, financial performance measures, transfer pricing, strategic performance measurement systems.

We will use international material written in English.

We will approach these topics primarily from the perspective of the users of financial information (not so much from the controller who prepares the information).

The course builds on an introductory level of understanding of accounting concepts from Business Administration courses in the core program. The course is intended for students in Industrial Engineering.

**Learning objectives:**
- Students have an understanding of theory and applications of management accounting topics. They can use financial information for various purposes in organizations.

**Recommendations:**
- It is recommended to take part in the course “Management Accounting 1” before this course.

**Examination:**
- The assessment consists of a written exam (120 min) at the end of each semester (following § 4 (2) No. 1 of the examination regulation).

**Workload:**
- The total workload for this course is approximately 135.0 hours. For further information see German version.

**Literature**
- Zusätzlich werden Artikel auf ILIAS zur Vergütung gestellt.
8.150 Course: Management and Marketing [T-WIWI-111594]

**Responsible:** Prof. Dr. Martin Klarmann  
Prof. Dr. Hagen Lindstädt  
Prof. Dr. Petra Nieken  
Prof. Dr. Orestis Terzidis

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-105768 - Management and Marketing

**Type:** Written examination  
**Credits:** 5  
**Grading scale:** Grade to a third  
**Recurrence:** Each winter term  
**Version:** 2

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<td>Lecture / 🗣️</td>
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**Legend:** 🖥 Online, 🧩 Blended (On-Site/Online), 🗣️ On-Site, ✗ Cancelled

**Competence Certificate**  
Written exam on the two courses "Management" and "Marketing". The examination is offered at the beginning of each lecture-free period. Repeat examinations are possible at any regular examination date.

**Prerequisites**  
None

*Below you will find excerpts from events related to this course:*

**Marketing**  
2610026, WS 23/24, 2 SWS, Language: German, [Open in study portal](#)  
Lecture (V) Blended (On-Site/Online)

**Literature**  
Ausführliche Literaturhinweise werden in den Materialen zur Vorlesung gegeben.
8.151 Course: Managing Organizations [T-WIWI-102630]

**Responsible:** Prof. Dr. Hagen Lindstädt

**Organisation:** KIT Department of Economics and Management

**Part of:**
- M-WIWI-101425 - Strategy and Organization
- M-WIWI-101513 - Human Resources and Organizations

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<td>Lindstädt</td>
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Legend: 📱 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✗ Cancelled

**Competence Certificate**

The assessment will consist of a written exam (60 min) taking place at the beginning of the recess period (according to Section 4 (2), 2 of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

**Prerequisites**

None

*Below you will find excerpts from events related to this course:*

<table>
<thead>
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<th>V</th>
<th>Managing Organizations</th>
<th>Lecture (V)</th>
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<td>2577902, WS 23/24, 2 SWS</td>
<td>On-Site</td>
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</table>
Content
This course enables participants to make a sound assessment of existing organizational structures and regulations. Students learn concepts and models for designing organizational structures, regulating organizational processes, and managing organizational change.

Through intensive exposure to real-world case studies, students are encouraged to learn and apply strategic actions in real-world business settings. The course features an action-oriented approach and provides students with a realistic understanding of the possibilities and limitations of rational design approaches.

Content in Keywords:
- Fundamentals of organizational management: fundamental concepts and theoretical background knowledge
- Management of organizational structures and processes: Corporate headquarters, departmental organization, instruction structure and incentive systems
- Ideal organizational structures: organic vs. mechanistic, Mintzberg’s types, relationship to strategy and 7S model
- Management of organizational change (change management): Change processes within an organization, management of revolutionary change

Structure:
Lectures in the course are available to students online as recordings, while class dates are reserved for active discussion of real-world case studies.

Learning Objectives:
Upon completion of the course, students will be able to,

- critically evaluate existing organizational structures and regulations
- compare alternative structural options in a practical setting and evaluate and interpret their effectiveness and efficiency
- analyze and evaluate change processes in organizational management
- apply theoretical knowledge in practical situations

Recommendations:
None.

Workload:
- Total workload for 3.5 credit points: approx. 105 hours
- Attendance time: 30 hours
- Self-study: 75 hours

Verification:
The assessment of success takes place in the form of a written examination (60min.) (according to §4(2), 1 SPO) at the beginning of the lecture-free period of the semester. The examination is offered every semester and can be repeated at any regular examination date.

A bonus can be earned through successful participation in the exercise. If the grade on the written exam is between 4.0 and 1.3, the bonus improves the grade by one grade level (0.3 or 0.4). The exact criteria for awarding a bonus will be announced at the beginning of the lecture.

Literature

Die relevanten Auszüge und zusätzlichen Quellen werden in der Veranstaltung bekannt gegeben.
8.152 Course: Managing the Marketing Mix [T-WIWI-102805]

Responsibe: Prof. Dr. Martin Klarmann
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101424 - Foundations of Marketing

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Exams

| ST 23 | 7900023 | Managing the Marketing Mix | Klarmann |
| WT 23/24 | 7900061 | Managing the Marketing Mix | Klarmann |

Competence Certificate
The assessment of success takes place through the preparation and presentation of a case study (max. 30 points) as well as a written exam with additional aids in the sense of an open book exam (max. 60 points). In total, a maximum of 90 points can be achieved in the course. Further details will be announced during the lecture.

Prerequisites
None

Annotation
The course is compulsory in the module “Foundations of Marketing”. For further information please contact Marketing & Sales Research Group (marketing.iism.kit.edu).

Below you will find excerpts from events related to this course:

Managing the Marketing Mix
2571152, SS 2023, 2 SWS, Language: German, Open in study portal

Content
The content of this course concentrates on the elements of the marketing mix. Therefore the main chapters are brand management, pricing, promotion and sales management.

For further information please contact Marketing & Sales Research Group (marketing.iism.kit.edu).

Learning objectives:
- student
- know the meaning of the branding, the brand positioning and the possibilities of the brand value calculation
- understand the price behavior of customers and can apply this knowledge to the practice
- know different methods for price determination (conjoint analysis, cost-plus determination, target costing, customer surveys, bidding procedures) and price differentiation
- are able to name and explain the relevant communication theories
- can identify crisis situations and formulate appropriate response strategies
- can name and judge different possibilities of the Intermediaplanung
- know various design elements of advertising communication
- understand the measurement of advertising impact and can apply it
- know the basics of sales organization
- are able to evaluate basic sales channel decisions

Workload:
The total workload for this course is approximately 135.0 hours.
Literature
8.153 Course: Manufacturing Measurement Technology [T-ETIT-106057]

**Responsible:** Prof. Dr.-Ing. Michael Heizmann  
**Organisation:** KIT Department of Electrical Engineering and Information Technology  
**Part of:** M-ETIT-106581 - Measurement, Control, and Manufacturing Measurement Technology

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Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✗ Cancelled
8.154 Course: Manufacturing Technology [T-MACH-102105]

**Responsible:** Prof. Dr.-Ing. Volker Schulze

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101276 - Manufacturing Technology

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**Type**

- Written examination

**Credits**

- 9

**Grading scale**

- Grade to a third

**Recurrence**

- Each winter term

**Version**

- 3

**Events**

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**Exams**

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**Legend:**

- Online
- Blended (On-Site/Online)
- On-Site
- Cancelled

**Competence Certificate**

- Written Exam (180 min)

**Prerequisites**

- none

Below you will find excerpts from events related to this course:

**Manufacturing Technology**

- 2149657, WS 23/24, 6 SWS, Language: German, [Open in study portal]
- Lecture / Practice (VÜ)
- Blended (On-Site/Online)
Content
The objective of the lecture is to look at manufacturing technology within the wider context of production engineering, to provide an overview of the different manufacturing processes and to impart detailed process knowledge of the common processes. The lecture covers the basic principles of manufacturing technology and deals with the manufacturing processes according to their classification into main groups regarding technical and economic aspects. The lecture is completed with topics such as process chains in manufacturing.

The following topics will be covered:

- Quality control
- Primary processing (casting, plastics engineering, sintering, additive manufacturing processes)
- Forming (sheet-metal forming, massive forming, plastics engineering)
- Cutting (machining with geometrically defined and geometrically undefined cutting edges, separating, abrading)
- Joining
- Coating
- Heat treatment and surface treatment
- Process chains in manufacturing

This lecture provides an excursion to an industry company.

Learning Outcomes:
The students ...

- are capable to specify the different manufacturing processes and to explain their functions.
- are able to classify the manufacturing processes by their general structure and functionality according to the specific main groups.
- have the ability to perform a process selection based on their specific characteristics.
- are enabled to identify correlations between different processes and to select a process regarding possible applications.
- are qualified to evaluate different processes regarding specific applications based on technical and economic aspects.
- are experienced to classify manufacturing processes in a process chain and to evaluate their specific influence on surface integrity of workpieces regarding the entire process chain.

Workload:
regular attendance: 63 hours
self-study: 177 hours

Organizational issues
Vorlesungstermine montags und dienstags, Übungstermine mittwochs.
Bekanntgabe der konkreten Übungstermine erfolgt in der ersten Vorlesung.

Literature
Medien:
Skript zur Veranstaltung wird über ilias (https://ilias.studium.kit.edu/) bereitgestellt.

Media:
Lecture notes will be provided in ilias (https://ilias.studium.kit.edu/).
8 COURSES

8.155 Course: Material Science II for Business Engineers [T-MACH-102079]

**Responsible:** Prof. Dr. Michael Hoffmann  
**Organisation:** KIT Department of Mechanical Engineering

**Part of:**  
- M-MACH-101261 - Emphasis in Fundamentals of Engineering  
- M-MACH-101262 - Emphasis Materials Science  
- M-WIWI-101839 - Additional Fundamentals of Engineering

<table>
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**Events**

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<td>Materials Science II for Business Engineers</td>
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**Exams**

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<td>Material Science II</td>
<td>Lecture</td>
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Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🔴 On-Site, ✗ Cancelled

**Competition Certificate**
The assessment consists of a written examination (150 min) taking place in the recess period (according to Section 4(2), 1 of the examination regulation). The examination takes place every semester. Re-examinations are offered at every ordinary examination date. The examination at the end of the winter term is carried out by a written or oral exam.

**Prerequisites**
The module Material Science has to be completed beforehand.

**Below you will find excerpts from events related to this course:**

**Materials Science II for Business Engineers**

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**Literature**

**Weiterführende Literatur:**

8 COURSES
Course: Materials Science I [T-MACH-102078]

8.156 Course: Materials Science I [T-MACH-102078]

Responsible: Prof. Dr. Michael Hoffmann
Organisation: KIT Department of Mechanical Engineering
Part of: M-MACH-101260 - Materials Science

<table>
<thead>
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<td>Lecture / Blended (On-Site/Online)</td>
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Exams

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Competence Certificate

The assessment consists of a written examination (150 min) taking place in the recess period (according to Section 4(2), 1 of the examination regulation). The examination takes place every semester. Re-examinations are offered at every ordinary examination date. The examination at the end of the summer term is carried out by a written or oral exam.

Prerequisites

None

Below you will find excerpts from events related to this course:

Materials Science I

2125760, WS 23/24, 2 SWS, Language: German, Open in study portal

Lecture (V)

Blended (On-Site/Online)

Literature

Weiterführende Literatur:

- Werkstoffwissenschaften, Schatt, Werner / Woroch, Hartmut (Hrsg.) Wiley-VCH, Weinheim, ISBN-10: 3-527-30535-1
8 COURSES

8.157 Course: Mathematics I - Final Exam [T-MATH-111493]

**Responsible:** Prof. Dr. Daniel Hug
Prof. Dr. Günter Last
Dr. Franz Nestmann
PD Dr. Steffen Winter

**Organisation:** KIT Department of Mathematics

**Part of:** M-MATH-105754 - Mathematics 1

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Industrial Engineering and Management B.Sc.
Module Handbook as of 04/10/2023
8.158 Course: Mathematics I - Midterm Exam [T-MATH-111492]

**Responsible:**
- Prof. Dr. Daniel Hug
- Prof. Dr. Günter Last
- Dr. Franz Nestmann
- PD Dr. Steffen Winter

**Organisation:**
- KIT Department of Mathematics

**Part of:**
- M-MATH-105754 - Mathematics 1

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<td>00021</td>
<td>Mathematics II - Final Exam</td>
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### 8.160 Course: Mathematics II - Midterm Exam [T-MATH-111495]

**Responsible:** Prof. Dr. Daniel Hug  
Prof. Dr. Günter Last  
Dr. Franz Nestmann  
PD Dr. Steffen Winter  

**Organisation:** KIT Department of Mathematics  

**Part of:** M-MATH-105756 - Mathematics 2

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<td>Nestmann, Winter, Last</td>
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# 8.161 Course: Mathematics III - Final Exam [T-MATH-111498]

**Responsible:** Prof. Dr. Daniel Hug  
Prof. Dr. Günter Last  
Dr. Franz Nestmann  
PD Dr. Steffen Winter

**Organisation:** KIT Department of Mathematics

**Part of:** M-MATH-105757 - Mathematics 3

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### 8.162 Course: Measurement and Control Technology [T-ETIT-112852]

**Responsible:** Prof. Dr.-Ing. Michael Heizmann  
Prof. Dr.-Ing. Sören Hohmann

**Organisation:** KIT Department of Electrical Engineering and Information Technology

**Part of:** M-ETIT-106581 - Measurement, Control, and Manufacturing Measurement Technology

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**Competence Certificate**  
The assessment of success takes place in the form of a written examination lasting 120 minutes. The module grade is the grade of the written examination.

**Prerequisites**  
none
8 COURSES

Course: Mechanical Design A [T-MACH-112984]

8.163 Course: Mechanical Design A [T-MACH-112984]

Responsible: Prof. Dr.-Ing. Sven Matthiesen
Organisation: KIT Department of Mechanical Engineering
Part of: M-MACH-106527 - Mechanical Design A

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Exams

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Competence Certificate
Written exam with a duration of 90 Minutes

Prerequisites
Admission to the exam only with successful completion of Workshop Mechanical Design A (T-MACH-112981)

Recommendation
None

Annotation
Students are familiar with the basic machine elements of technical systems and are able to analyze them in a system context

Below you will find excerpts from events related to this course:

Mechanical Design A
2145170, WS 23/24, 3 SWS, Language: German, Open in study portal

Content
Students are introduced to fundamental topics in Mechanical Design A. The focus is on the analysis of existing systems and the development of knowledge for fundamental elements and functionality of technical systems. The course is divided into the following topics:

- Springs
- Technical systems
- Bearings
- Seals
- Component connection
- Gearbox

Literature

- Grundlagen von Maschinenelementen für Antriebsaufgaben; Steinhilper, Sauer, Springer Verlag, ISBN 3-540-29629-8
8.164 Course: Mechanical Design A, Workshop [T-MACH-112981]

**Responsible:** Prof. Dr.-Ing. Sven Matthiesen

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-106527 - Mechanical Design A

<table>
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**Events**

Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ❌ Canceled

**Competence Certificate**

Concomitant to the lecture, a workshop with 3 workshop sessions takes place over the semester. During the workshop the students are divided into groups and their mechanical design knowledge will be tested during a colloquium at the beginning of every single workshop session. The attendance is mandatory and will be controlled.

The pass of the colloquia and the process of the workshop task are required for the successful participation.

**Prerequisites**

None

**Recommendation**

None

**Annotation**

None

Below you will find excerpts from events related to this course:

**Mechanical Design A - Workshop**

2145171, WS 23/24, 1 SWS, Language: German, [Open in study portal]

**Content**

In addition to the MD A lecture, the students are familiarized with the design process in a series of three workshops. The focus here is on application-oriented learning and understanding. For example, the students independently disassemble and assemble small demonstrator systems and thus gain a better understanding of the relevant problems in the field of mechanical design.

**Literature**

- Grundlagen von Maschinenelementen für Antriebsaufgaben; Steinhilper, Sauer, Springer Verlag, ISBN 3-540-29629-8
Course: Mechanical Design I and II [T-MACH-112225]

**Responsible:** Prof. Dr.-Ing. Sven Matthiesen  
**Organisation:** KIT Department of Mechanical Engineering  
**Part of:** M-MACH-101299 - Mechanical Design

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**Exams**

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**Legend:**  
🖥 Online, 🏷 Blended (On-Site/Online), 🗣 On-Site, ❌ Canceled

**Competence Certificate**  
Written Exam (90min) on the topics of MKL I and MKL II.

**Prerequisites**  
The bricks "T-MACH-112226 - Mechanical Design I, Tutorial" and "T-MACH-112227 - Mechanical Design II, Tutorial" must be passed successfully.

**Below you will find excerpts from events related to this course:**

**Mechanical Design II**  
2146178, SS 2023, 2 SWS, Language: German, [Open in study portal](#)

**Content**

**Lecture content:**  
Bearings  
Sealings  
Design  
Bolted Connections

**Prerequisites**  
Concomitant to the lecture 2 online tests were carried out and the knowledge from the lecture will be tested. The knowledge from mechanical design I and II will further be controlled with a design and a CAD task.  
Further information's will be announced at Ilias and at the beginning of the lecture mechanical design II.

**Literature**

**Konstruktionselemente des Maschinenbaus - 1 und 2**  
Grundlagen der Berechnung und Gestaltung von Maschinenelementen;  
or Volltextzugriff über Uni-Katalog der Universitätsbibliothek

**Grundlagen von Maschinenelementen für Antriebsaufgaben:**  
Steinhilper, Sauer, Springer Verlag, ISBN 3-540-29629-8

**Vorlesungsumdruck:**

Über die ILIAS-Plattform des RZ werden alle relevanten Inhalte (Folien zu Vorlesung und Saalübung, sowie Übungsblätter) entsprechend den Vorlesungsblöcken gebündelt zur Verfügung gestellt.
8.166 Course: Mechanical Design I, Tutorial [T-MACH-112226]

**Responsible:** Prof. Dr.-Ing. Sven Matthiesen

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101299 - Mechanical Design

<table>
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**Competence Certificate**

Concomitant to the lecture, a workshop with 3 workshop sessions takes place over the semester. During the workshop the students are divided into groups and their mechanical design knowledge will be tested during a colloquium at the beginning of every single workshop session. The attendance is mandatory and will be controlled. The pass of the colloquia and the process of the workshop task are required for the successful participation.

Furthermore an online test is carried out.
### Course: Mechanical Design II, Tutorial [T-MACH-112227]

**Responsible:** Prof. Dr.-Ing. Sven Matthiesen  
**Organisation:** KIT Department of Mechanical Engineering  
**Part of:** M-MACH-101299 - Mechanical Design

<table>
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**Exams**

| Event         | 76-T-MACH-110365     | Mechanical Design II, Tutorial |                     | Albers, Matthiesen, Düser |

*Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✗ Canceled*

**Competence Certificate**

CIW/ VT/ IP-M/ WiING/ MATH/ MWT: To pass the prerequisite it is required that a design task is successfully completed.

MIT: To pass the prerequisite it is required that a design task is successfully completed.

NWT: For students of the subject area NwT, the creation of a teaching video for the teaching of a technical system must be completed as a prerequisite for the exam instead.

**Prerequisites**

None

**Below you will find excerpts from events related to this course:**

**Tutorials Mechanical Design II**

2146185, SS 2023, 2 SWS, Language: German, Open in study portal

**Content**

Bearings  
Sealings  
Design  
Bolted connections  
tutorials: 10.5 h  
prerequisites and preparation to exam: 55 h

**Literature**

*Konstruktionselemente des Maschinenbaus* - 1 und 2  
Grundlagen der Berechnung und Gestaltung von Maschinenelementen;  
*Grundlagen von Maschinenelementen für Antriebsaufgaben*;  
Steinhilper, Sauer, Springer Verlag, ISBN 3-540-29629-8

**CAD:**

Pro/Engineer Tipps und Techniken, Wolfgang Berg, Hanser Verlag, ISBN: 3-446-22711-3 (für Fortgeschrittene)
### Course: Mechatronical Systems and Products (mach/etit/wiwi) [T-MACH-112647]

**Responsible:** Prof. Dr.-Ing. Sören Hohmann  
Prof. Dr.-Ing. Sven Matthiesen  

**Organisation:** KIT Department of Mechanical Engineering  
**Part of:** M-MACH-106236 - Mechatronic Product Design  

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#### Events

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**Competence Certificate**  
written exam (60 min)
8.169 Course: Metal Forming [T-MACH-105177]

**Responsible:** Prof. Dr.-Ing. Thomas Herlan

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-106590 - Production Engineering

<table>
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<td>Metal Forming</td>
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<td>Metal Forming - re-examination</td>
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**Legend:** 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, 🗑 Cancelled

**Competence Certificate**
Oral Exam (20 min)

**Prerequisites**
none

*Below you will find excerpts from events related to this course:*

**Metal Forming**
2150681, SS 2023, 2 SWS, Language: German, [Open in study portal](#)
Content
At the beginning of the lecture the basics of metal forming are briefly introduced. The focus of the lecture is on massive forming (forging, extrusion, rolling) and sheet forming (car body forming, deep drawing, stretch drawing). This includes the systematic treatment of the appropriate metal forming Machines and the corresponding tool technology. Aspects of tribology, as well as basics in material science and aspects of production planning are also discussed briefly. The plastic theory is presented to the extent necessary in order to present the numerical simulation method and the FEM computation of forming processes or tool design. The lecture will be completed by product samples from the forming technology.

The topics are as follows:

- Introduction and basics
- Hot forming
- Metal forming machines
- Tools
- Metallographic fundamentals
- Plastic theory
- Tribology
- Sheet forming
- Extrusion
- Numerical simulation

Learning Outcomes:
The students ...

- are able to reflect the basics, forming processes, tools, Machines and equipment of metal forming in an integrated and systematic way.
- are capable to illustrate the differences between the forming processes, tools, machines and equipment with concrete examples and are qualified to analyze and assess them in terms of their suitability for the particular application.
- are also able to transfer and apply the acquired knowledge to other metal forming problems.

Workload:
regular attendance: 21 hours
self-study: 99 hours

Organizational issues
Vorlesungstermine freitags, wöchentlich.
Die konkreten Termine werden in der ersten Vorlesung bekannt gegeben und auf der Institutshomepage und ILIAS veröffentlicht.
Zur Vertiefung des im Rahmen der Lehrveranstaltung erworbenen Wissens werden die theoretischen Vorlesungseinheiten durch Praxiseinheiten im Umfeld der Karlsruher Forschungsfabrik (https://www.karlsruher-forschungsfabrik.de) unterstützt.

The theoretical lectures are complemented by practical lectures in the Karlsruhe Research Factory (https://www.karlsruher-forschungsfabrik.de/en.html) to deepen the acquired knowledge.

Literature
Medien:
Skript zur Veranstaltung wird über (https://ilias.studium.kit.edu/) bereitgestellt.

Media:
Lecture notes will be provided in Ilias (https://ilias.studium.kit.edu/)
8.170 Course: Microactuators [T-MACH-101910]

**Responsible:** Prof. Dr. Manfred Kohl

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101287 - Microsystem Technology

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Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

**Competence Certificate**

written exam, 60 min.

**Prerequisites**

none

Below you will find excerpts from events related to this course:

**Microactuators**

2142881, SS 2023, 2 SWS, Language: German, [Open in study portal](#)

**Lecture (V)**

On-Site

**Content**

- Basic knowledge in the material science of the actuation principles
- Layout and design optimization
- Fabrication technologies
- Selected developments
- Applications

The lecture includes amongst others the following topics:

- Microelectromechanical systems: linear actuators, microrelais, micromotors
- Medical technology and life sciences: Microvalves, micropumps, microfluidic systems
- Microrobotics: Microgrippers, polymer actuators (smart muscle)
- Information technology: Optical switches, mirror systems, read/write heads

**Literature**

- Folienskript "Mikroaktorik"
- M. Kohl, Shape Memory Microactuators, M. Kohl, Springer-Verlag Berlin, 2004
### 8.171 Course: Microeconometrics [T-WIWI-112153]

<table>
<thead>
<tr>
<th><strong>Responsible:</strong></th>
<th>Prof. Dr. Fabian Krüger</th>
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<td><strong>Organisation:</strong></td>
<td>KIT Department of Economics and Management</td>
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| **Part of:**     | M-WIWI-101599 - Statistics and Econometrics  
|                  | M-WIWI-105414 - Statistics and Econometrics II |

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**Competence Certificate**
The assessment consists of a written exam (60 min).

**Prerequisites**
None

**Recommendation**
Course participants are expected to know econometrics at the level of 'Volkswirtschaftslehre III: Einführung in die Ökonometrie'
# 8.172 Course: Mobile Machines [T-MACH-105168]

**Responsible:** Prof. Dr.-Ing. Marcus Geimer  
**Organisation:** KIT Department of Mechanical Engineering

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**Part of:** M-MACH-101267 - Mobile Machines

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**Exams**

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**Competence Certificate**

The assessment consists of an oral exam (45 min) taking place in the recess period. The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

**Prerequisites**

none

**Recommendation**

Knowledge in Fluid Power Systems is required. It is recommended to attend the course *Fluid Power Systems [2114093]* beforehand.

**Annotation**

After completion of the course the students have knowledge of:

- a wide range of mobile machines
- operation modes and working cycles of important mobile machines
- selected subsystems and components

**Content:**

- Introduction of the required components and machines
- Basics and structure of mobile machines
- Practical insight in the development techniques

**Below you will find excerpts from events related to this course:**

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<th>Mobile Machines</th>
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**Content**

- Introduction of the required components and machines
- Basics of the structure of the whole system
- Practical insight in the development techniques

Knowledge in Fluid Power is required.

**Recommendations:**

It is recommended to attend the course *Fluid Power Systems [2114093]* beforehand.

- regular attendance: 42 hours
- self-study: 184 hours
8.173 Course: Mobility and Infrastructure [T-BGU-101791]

**Responsible:** Prof. Dr.-Ing. Peter Vortisch  
**Organisation:** KIT Department of Civil Engineering, Geo and Environmental Sciences  
**Part of:** M-BGU-101067 - Mobility and Infrastructure

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<td>6200409</td>
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**Exams**

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<td>Mobility and Infrastructure</td>
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**Legend:** 🖥 Online, 🧩 Blended (On-Site/Online), 🧩 On-Site, ✗ Cancelled

**Competence Certificate**

Written exam, 150 min.

**Prerequisites**

None

**Recommendation**

For students from the KIT-Department of Economics and Management it is recommended to take part in the exercises.

**Annotation**

None

**Responsible:** Prof. Dr. Stefan Nickel  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101413 - Applications of Operations Research

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<td>ST 2023</td>
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<td>Modellieren und OR-Software: Einführung</td>
<td>3 SWS</td>
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**Exams**

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<td>Modeling and OR-Software: Introduction</td>
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<td>Modeling and OR-Software: Introduction</td>
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**Legend:** 🔥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✗ Cancelled

**Competence Certificate**
The assessment is a written examination. The examination is held in every semester. The prerequisite can only be obtained in semesters in which the course exercises are offered.

**Prerequisites**
Prerequisite for admission to the exam is the successful participation in the exercises. This includes the processing and presentation of exercises.

**Recommendation**
Firm knowledge of the contents from the lecture *Introduction to Operations Research I* [2550040] of the module *Operations Research*.

**Annotation**
Due to capacity restrictions, registration before course start is required. For further information see the webpage of the course. The lecture is offered in every term. The planned lectures and courses for the next three years are announced online.

*Below you will find excerpts from events related to this course:*

### Modellieren und OR-Software: Einführung

**2550490, SS 2023, 3 SWS, Language: German, [Open in study portal]**

**Content**
After an introduction to general concepts of modelling tools (implementation, data handling, result interpretation, ...), the software IBM ILOG CPLEX Optimization Studio and the corresponding modeling language OPL will be discussed which can be used to solve OR problems on a computer-aided basis. Subsequently, a broad range of exercises will be discussed. The main goals of the exercises from literature and practical applications are to learn the process of modeling optimization problems as linear or mixed-integer programs, to efficiently utilize the presented tools for solving these optimization problems and to implement heuristic solution procedures for mixed-integer programs.

**Organizational issues**
Die Teilnehmerzahl für diese Veranstaltung ist begrenzt. Bewerbung bis 31.03. möglich:
http://go.wiwi.kit.edu/OR_Bewerbung
Course: Nonlinear Optimization I [T-WIWI-102724]

**Responsible:** Prof. Dr. Oliver Stein  
**Organisation:** KIT Department of Economics and Management  
**Part of:**  
- M-WIWI-101414 - Methodical Foundations of OR  
- M-WIWI-103278 - Optimization under Uncertainty

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<td>2 SWS</td>
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**Competence Certificate**

The assessment consists of a written exam (60 minutes) according to Section 4(2), 1 of the examination regulation. The successful completion of the exercises is required for admission to the written exam. The exam takes place in the semester of the lecture and in the following semester.

The examination can also be combined with the examination of Nonlinear Optimization II [2550113]. In this case, the duration of the written examination takes 120 minutes.

**Prerequisites**

The module component exam T-WIWI-103637 “Nonlinear Optimization I and II” may not be selected.

**Annotation**

Part I and II of the lecture are held consecutively in the same semester.

Below you will find excerpts from events related to this course:

### Nonlinear Optimization I

**2550111, WS 23/24, 2 SWS, Language: German, Open in study portal**

#### Lecture (V)

**On-Site**

**Content**

The lecture treats the minimization of smooth nonlinear functions without constraints. For such problems, which occur very often in economics, engineering, and natural sciences, optimality conditions are derived and, based on them, solution algorithms are developed. The lecture is structured as follows:

- Introduction, examples, and terminology  
- Existence results for optimal points  
- First and second order optimality conditions  
- Algorithms (line search, steepest descent method, variable metric methods, Newton method, Quasi Newton methods, CG method, trust region method)

The lecture is accompanied by exercises which, amongst others, offers the opportunity to implement and to test some of the methods on practically relevant examples.

**Remark:**

The treatment of optimization problems with constraints forms the contents of the lecture “Nonlinear Optimization II”. The lectures “Nonlinear Optimization I” and “Nonlinear Optimization II” are held consecutively in the same semester.

**Learning objectives:**

The student

- knows and understands fundamentals of unconstrained nonlinear optimization,  
- is able to choose, design and apply modern techniques of unconstrained nonlinear optimization in practice.
Literature

Weiterführende Literatur:

- W. Alt, Nichtlineare Optimierung, Vieweg, 2002
- M.S. Bazaraa, H.D. Sherali, C.M. Shetty, Nonlinear Programming, Wiley, 1993
**8.176 Course: Nonlinear Optimization I and II [T-WIWI-103637]**

**Responsible:** Prof. Dr. Oliver Stein  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101414 - Methodical Foundations of OR  

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**Legend:** 🖥 Online, 🎓 Blended (On-Site/Online), 🗣 On-Site, ❌ Cancelled

**Competence Certificate**
The assessment consists of a written exam (120 minutes) according to Section 4(2), 1 of the examination regulation. The successful completion of the exercises is required for admission to the written exam. The exam takes place in the semester of the lecture and in the following semester.

**Prerequisites**
None.

**Annotation**
Part I and II of the lecture are held consecutively in the same semester.

**Below you will find excerpts from events related to this course:**

**Nonlinear Optimization I**

2550111, WS 23/24, 2 SWS, Language: German, Open in study portal

**Lecture (V)**

On-Site

**Content**
The lecture treats the minimization of smooth nonlinear functions without constraints. For such problems, which occur very often in economics, engineering, and natural sciences, optimality conditions are derived and, based on them, solution algorithms are developed. The lecture is structured as follows:

- Introduction, examples, and terminology
- Existence results for optimal points
- First and second order optimality conditions
- Algorithms (line search, steepest descent method, variable metric methods, Newton method, Quasi Newton methods, CG method, trust region method)

The lecture is accompanied by exercises which, amongst others, offers the opportunity to implement and to test some of the methods on practically relevant examples.

**Remark:**
The treatment of optimization problems with constraints forms the contents of the lecture "Nonlinear Optimization II". The lectures "Nonlinear Optimization I" and "Nonlinear Optimization II" are held consecutively in the same semester.

**Learning objectives:**
The student

- knows and understands fundamentals of unconstrained nonlinear optimization,
- is able to choose, design and apply modern techniques of unconstrained nonlinear optimization in practice.
Nonlinear Optimization II
2550113, WS 23/24, 2 SWS, Language: German, Open in study portal

Content
The lecture treats the minimization of smooth nonlinear functions under nonlinear constraints. For such problems, which occur very often in economics, engineering, and natural sciences, optimality conditions are derived and, based on them, solution algorithms are developed. The lecture is structured as follows:

- Topology and first order approximations of the feasible set
- Theorems of the alternative, first and second order optimality conditions
- Algorithms (penalty method, multiplier method, barrier method, interior point method, SQP method, quadratic optimization)

The lecture is accompanied by exercises which, amongst others, offers the opportunity to implement and to test some of the methods on practically relevant examples.

Remark:
The treatment of optimization problems without constraints forms the contents of the lecture "Nonlinear Optimization I". The lectures "Nonlinear Optimization I" and "Nonlinear Optimization II" are held consecutively in the same semester.

Learning objectives:
The student

- knows and understands fundamentals of constrained nonlinear optimization,
- is able to choose, design and apply modern techniques of constrained nonlinear optimization in practice.

Literature

Weiterführende Literatur:
- W. Alt, Nichtlineare Optimierung, Vieweg, 2002
- M.S. Bazaraa, H.D. Sherali, C.M. Shetty, Nonlinear Programming, Wiley, 1993
Course: Nonlinear Optimization II [T-WIWI-102725]

Responsible: Prof. Dr. Oliver Stein
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101414 - Methodical Foundations of OR

Type: Written examination
Credits: 4.5
Grading scale: Grade to a third
Recurrence: Each winter term
Version: 3

Events

| WT 23/24 | 2550112 | Exercises Nonlinear Optimization I + II | Practice / 🗣 | Stein, Schwarz |
| WT 23/24 | 2550113 | Nonlinear Optimization II | 2 SWS | Lecture / 🗣 | Stein |

Exams

| ST 2023 | 7900023_SS2023_NK | Nonlinear Optimization II | Stein |
| WT 23/24 | 7900002_WS2324_HK | Nonlinear Optimization II | Stein |

Competence Certificate
The assessment consists of a written exam (60 minutes) according to Section 4(2), 1 of the examination regulation. The successful completion of the exercises is required for admission to the written exam.

The exam takes place in the semester of the lecture and in the following semester.

The exam can also be combined with the examination of Nonlinear Optimization I [2550111]. In this case, the duration of the written exam takes 120 minutes.

Prerequisites
None.

Annotation
Part I and II of the lecture are held consecutively in the same semester.

Below you will find excerpts from events related to this course:

Nonlinear Optimization II
2550113, WS 23/24, 2 SWS, Language: German, Open in study portal

Content
The lecture treats the minimization of smooth nonlinear functions under nonlinear constraints. For such problems, which occur very often in economics, engineering, and natural sciences, optimality conditions are derived and, based on them, solution algorithms are developed. The lecture is structured as follows:

- Topology and first order approximations of the feasible set
- Theorems of the alternative, first and second order optimality conditions
- Algorithms (penalty method, multiplier method, barrier method, interior point method, SQP method, quadratic optimization)

The lecture is accompanied by exercises which, amongst others, offers the opportunity to implement and to test some of the methods on practically relevant examples.

Remark:
The treatment of optimization problems without constraints forms the contents of the lecture "Nonlinear Optimization I". The lectures "Nonlinear Optimization I" and "Nonlinear Optimization II" are held consecutively in the same semester.

Learning objectives:
The student

- knows and understands fundamentals of constrained nonlinear optimization,
- is able to choose, design and apply modern techniques of constrained nonlinear optimization in practice.
Literature

Weiterführende Literatur:

- W. Alt, Nichtlineare Optimierung, Vieweg, 2002
- M.S. Bazaraa, H.D. Sherali, C.M. Shetty, Nonlinear Programming, Wiley, 1993
8.178 Course: Novel Actuators and Sensors [T-MACH-102152]

Responsible: Prof. Dr. Manfred Kohl  
Dr. Martin Sommer

Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101287 - Microsystem Technology

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Events

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</table>

Competence Certificate

written exam, 60 minutes

Prerequisites

none

Below you will find excerpts from events related to this course:

Novel actuators and sensors

2141865, WS 23/24, 2 SWS, Language: German, Open in study portal

Literature

- Vorlesungsskript "Neue Aktoren" und Folienskript "Sensoren"
- Donald J. Leo, Engineering Analysis of Smart Material Systems, John Wiley & Sons, Inc., 2007
**8.179 Course: Operative CRM [T-WIWI-102597]**

**Responsible:** Prof. Dr. Andreas Geyer-Schulz  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101422 - Specialization in Customer Relationship Management

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**Competence Certificate**

Written examination (60 minutes) according to §4(2), 1 SPO. The exam is considered passed if at least 50 out of a maximum of 100 possible points are achieved. The grades are graded in five steps (best grade 1.0 from 95 points). Details of the grade formation and scale will be announced in the course.

A bonus can be acquired through successful participation in the practice. If the grade of the written examination is between 4.0 and 1.3, the bonus improves the grade by one grade level (0.3 or 0.4). The exact criteria for awarding a bonus will be announced at the beginning of the course.

**Prerequisites**

None

**Recommendation**

The attendance of courses Customer Relationship Management and Analytical CRM is advised.
# 8.180 Course: Optimization under Uncertainty [T-WIWI-106545]

**Responsible:** Prof. Dr. Steffen Rebennack  
**Organisation:** KIT Department of Economics and Management  
**Part of:**  
- M-WIWI-101413 - Applications of Operations Research  
- M-WIWI-103278 - Optimization under Uncertainty  

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## Events

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## Exams

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<td>7900322</td>
<td>Optimization under Uncertainty</td>
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Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ❌ Cancelled

### Competence Certificate

The assessment consists of a written exam (60 minutes) according to Section 4(2), 1 of the examination regulation. The exam takes place in every the semester.

### Prerequisites

None.
### 8.181 Course: Optoelectronic Components [T-ETIT-101907]

**Responsible:** Prof. Dr. Wolfgang Freude  
**Organisation:** KIT Department of Electrical Engineering and Information Technology  
**Part of:** M-MACH-101287 - Microsystem Technology

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**Exams**

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**Legend:**  
- 🖥 Online  
- 🧩 Blended (On-Site/Online)  
- 🗣 On-Site  
- 🗑 Cancelled

**Prerequisites**

none
Responsible: Prof. Dr. Petra Nieken
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101513 - Human Resources and Organizations
M-WIWI-101668 - Economic Policy I

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Events

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Exams

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Competence Certificate
The assessment of this course is a written examination of 1 hour. The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.
In case of a small number of registrations, we might offer an oral exam instead of a written exam.

Prerequisites
None

Recommendation
Completion of module Business Administration is recommended.
Basic knowledge of microeconomics, game theory, and statistics is recommended.

Below you will find excerpts from events related to this course:

Personnel Policies and Labor Market Institutions
2573001, SS 2023, 2 SWS, Language: German, Open in study portal
Content
The students acquire knowledge about the process and the strategic aspects of collective bargaining about wages. They analyze selected aspects of corporate governance and co-determination in Germany. The lecture also addresses questions of personnel politics and labor market discrimination. Microeconomic and behavioral approaches as well as empirical data is used and evaluated critically.

Aim
The student

- understands the process and role of agents in collective wage bargaining.
- analyzes strategic decisions in the context of corporate governance.
- understands the concept of co-determination in Germany.
- challenges statements that evaluate certain personnel politics.

Workload
The total workload for this course is approximately 135 hours.
Lecture 32 hours
Preparation of lecture 52 hours
Exam preparation 51 hours

Literature
### 8.183 Course: PH APL-ING-TL01 [T-WIWI-106291]

**Organisation:** University  
**Part of:** M-WIWI-101404 - Extracurricular Module in Engineering

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### 8.184 Course: PH APL-ING-TL02 [T-WIWI-106292]

**Organisation:** University  
**Part of:** M-WIWI-101404 - Extracurricular Module in Engineering

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### 8.185 Course: PH APL-ING-TL03 [T-WIWI-106293]

**Organisation:** University  
**Part of:** M-WIWI-101404 - Extracurricular Module in Engineering

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### 8.187 Course: PH APL-ING-TL05 ub [T-WIWI-106295]

**Organisation:** University  
**Part of:** M-WIWI-101404 - Extracurricular Module in Engineering

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## 8.188 Course: PH APL-ING-TL06 ub [T-WIWI-106296]

**Organisation:** University  
**Part of:** M-WIWI-101404 - Extracurricular Module in Engineering

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8.189 Course: PH APL-ING-TL07 [T-WIWI-108384]

Organisation: University
Part of: M-WIWI-101404 - Extracurricular Module in Engineering

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8.190 Course: Photovoltaic System Design [T-ETIT-100724]

**Responsible:** Dipl.-Ing. Robin Grab

**Organisation:** KIT Department of Electrical Engineering and Information Technology

**Part of:** M-ETIT-101165 - Energy Generation and Network Components

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### Events

| ST 2023 | 2307380 | Photovoltaische Systemtechnik | 2 SWS | Lecture / 🗣 | Grab |

| ST 2023 | 7307380 | Photovoltaics                 |       |              | Leibfried, Grab |

**Exams**

Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✗ Cancelled

**Prerequisites**

none
## 8.191 Course: Physical Basics of Laser Technology [T-MACH-102102]

### Responsible:
Dr.-Ing. Johannes Schneider

### Organisation:
KIT Department of Mechanical Engineering

### Part of:
M-MACH-101262 - Emphasis Materials Science

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### Exams

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### Competence Certificate
- oral examination (30 min)
- no tools or reference materials

### Prerequisites
- It is not possible to combine this brick with brick Laser Material Processing [T-MACH-112763], brick Laser Application in Automotive Engineering [T-MACH-105164] and brick Physical Basics of Laser Technology [T-MACH-109084]

### Recommendation
- Basic knowledge of physics, chemistry and material science

### Below you will find excerpts from events related to this course:

<table>
<thead>
<tr>
<th>Title</th>
<th>Contacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical basics of laser technology</td>
<td>Schneider</td>
</tr>
</tbody>
</table>

**Legend:**
- 🖥 Online
- 🧩 Blended (On-Site/Online)
- 🗂 On-Site
- ✗ Cancelled

---

Industrial Engineering and Management B.Sc.
Module Handbook as of 04/10/2023
Content
Based on the description of the physical basics about the formation and the properties of laser light the lecture goes through the different types of laser beam sources used in industry these days. The lecture focuses on the usage of lasers especially in materials engineering. Other areas like measurement technology or medical applications are also mentioned.

- physical basics of laser technology
- laser beam sources (solid state, diode, gas, liquid and other lasers)
- beam properties, guiding and shaping
- lasers in materials processing
- lasers in measurement technology
- lasers for medical applications
- safety aspects

The lecture is complemented by a tutorial.

The student

- can explain the principles of light generation, the conditions for light amplification as well as the basic structure and function of different laser sources.
- can describe the influence of laser, material and process parameters for the most important methods of laser-based materials processing and choose laser sources suitable for specific applications.
- can illustrate the possible applications of laser sources in measurement and medicine technology
- can explain the requirements for safe handling of laser radiation and for the design of safe laser systems.

Basic knowledge of physics, chemistry and material science is assumed.

regular attendance: 33,5 hours
self-study: 116,5 hours

The assessment consists of an oral exam (ca. 30 min) taking place at the agreed date (according to Section 4(2), 2 of the examination regulation). The re-examination is offered upon agreement.

It is allowed to select only one of the lectures "Laser in automotive engineering" (2182642) or "Physical basics of laser technology" (2181612) during the Bachelor and Master studies.

Organizational issues
Termine für die Übung werden in der Vorlesung bekannt gegeben!

Literature
T. Graf: Laser - Grundlagen der Laserstrahlerzeugung 2015, Springer Vieweg
R. Poprawe: Lasertechnik für die Fertigung, 2005, Springer
8.192 Course: Physics for Engineers [T-MACH-100530]

**Responsible:** Prof. Dr. Martin Dienwiebel
Prof. Dr. Peter Gumbsch
apl. Prof. Dr. Alexander Nesterov-Müller
Dr. Daniel Weygand

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101287 - Microsystem Technology

<table>
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**Events**

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<th>ST 2023</th>
<th>2142890</th>
<th>Physics for Engineers</th>
<th>4 SWS</th>
<th>Lecture / Practice / Weygand, Dienwiebel, Nesterov-Müller, Gumbsch</th>
</tr>
</thead>
</table>

**Exams**

| ST 2023   | 76-T-MACH-100530 | Physics for Engineers |        | Gumbsch, Weygand, Nesterov-Müller, Dienwiebel                     |
| WT 23/24  | 76-T-MACH-100530 | Physics for Engineers |        | Gumbsch, Dienwiebel, Nesterov-Müller, Weygand                    |

**Legend:** 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ❌ Cancelled

**Competence Certificate**
written exam 90 min

**Prerequisites**
none

*Below you will find excerpts from events related to this course:*
Content
1) Foundations of solid state physics
   - Wave particle dualism
   - Tunnelling
   - Schrödinger equation
   - H-atom

2) Electrical conductivity of solids
   - solid state: periodic potentials
   - Pauli Principle
   - band structure
   - metals, semiconductors and isolators
   - p-n junction / diode

3) Optics
   - quantum mechanical principles of the laser
   - linear optics
   - non-linear optics

Exercises are used for complementing and deepening the contents of the lecture as well as for answering more extensive questions raised by the students and for testing progress in learning of the topics.

The student
   - has the basic understanding of the physical foundations to explain the relationship between the quantum mechanical principles and the optical as well as electrical properties of materials
   - can describe the fundamental experiments, which allow the illustration of these principles

regular attendance: 22.5 hours (lecture) and 22.5 hours (exercises)
self-study: 105 hours

The assessment consists of a written exam (90 minutes) (following §4(2), 1 of the examination regulation).

Organizational issues
Kontakt: daniel.weygand@kit.edu

Literature
- Tipler und Mosca: Physik für Wissenschaftler und Ingenieure, Elsevier, 2004
- Harris, Moderne Physik, Pearson Verlag, 2013
8 COURSES

Course: Platform Economy [T-WIWI-107506]

<table>
<thead>
<tr>
<th>Responsible:</th>
<th>Prof. Dr. Christof Weinhardt</th>
</tr>
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<tr>
<td>Organisation:</td>
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<tr>
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Events

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<tr>
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<td>Lecture / ️</td>
<td>Weinhardt, Fegert</td>
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<td>Übung zu Platform Economy</td>
<td>Practice / ️</td>
<td>Pekkip, Stein</td>
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Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗯 On-Site, ❌ Cancelled

Competence Certificate
Alternative exam assessment. The assessment is carried out in the form of a one-hour written examination and by carrying out a case study. Details on the assessment will be announced during the lecture.

Prerequisites
see below

Recommendation
None

Below you will find excerpts from events related to this course:

Platform Economy
2540468, WS 23/24, 2 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Bibliography:
8 COURSES

Course: PLM-CAD Workshop [T-MACH-102153]

8.194 Course: PLM-CAD Workshop [T-MACH-102153]

Responsible: Prof. Dr.-Ing. Jivka Ovtcharova
Organisation: KIT Department of Mechanical Engineering
Part of: M-MACH-101270 - Product Lifecycle Management

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<td>Project / Ovtcharova, Mitarbeiter</td>
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Exams

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Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ❌ Cancelled

Competence Certificate
Alternative exam assessment (graded)

Prerequisites
None

Annotation
Number of participants is limited, compulsory attendance

Below you will find excerpts from events related to this course:

V PLM-CAD Workshop
2121357, SS 2023, 4 SWS, Language: German, Open in study portal

Project (PRO)
On-Site

Content
The aim of the workshop is to demonstrate the benefits of collaborative product development using PLM methods and to emphasize their added value compared to classical CAD development.

Students learn how to develop and produce a prototype with the help of modern PLM and CAx systems.

Organizational issues
Siehe Homepage zur Lehrveranstaltung

Literature
Workshop-Unterlagen / workshop materials

V PLM-CAD Workshop
2121357, WS 23/24, 4 SWS, Language: German, Open in study portal

Project (PRO)
On-Site

Content
The aim of the workshop is to demonstrate the benefits of collaborative product development using PLM methods and to emphasize their added value compared to classical CAD development.

Students learn how to develop and produce a prototype with the help of modern PLM and CAx systems.

Literature
Workshop-Unterlagen / workshop materials
8 COURSES

Course: Polymer Engineering I [T-MACH-102137]

**8.195 Course: Polymer Engineering I [T-MACH-102137]**

| Responsible: Dr.-Ing. Wilfried Liebig |
| Organisation: KIT Department of Mechanical Engineering |
| Part of: M-MACH-101262 - Emphasis Materials Science |

<table>
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<td>Liebig</td>
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</table>

**Competence Certificate**

Oral exam, about 25 minutes

**Prerequisites**

none

*Below you will find excerpts from events related to this course:*
Content
1. Economical aspects of polymers
2. Introduction of mechanical, chemical and electrical properties
3. Processing of polymers (introduction)
4. Material science of polymers
5. Synthesis

learning objectives:
The field of Polymer Engineering includes synthesis, material science, processing, construction, design, tool engineering, production technology, surface engineering and recycling. The aim is, to equip the students with knowledge and technical skills, and to use the material "polymer" meeting its requirements in an economical and ecological way.

The students
- are able to describe and classify polymers
- based on the fundamental synthesis processing techniques
- can find practical applications for state-of-the-art polymers and manufacturing technologies
- are able to apply the processing techniques, the application of polymers and polymer composites regarding to the basic principles of material science
- can describe the special mechanical, chemical and electrical properties of polymers and correlate these properties to the chemical bindings.
- can define application areas and the limitation in the use of polymers

requirements:
none

workload:
regular attendance: 21 hours
self-study: 99 hours

Literature
Literaturhinweise, Unterlagen und Teilmanuskript werden in der Vorlesung ausgegeben.
8.196 Course: Polymer Engineering II [T-MACH-102138]

**Responsible:** Dr.-Ing. Wilfried Liebig

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101262 - Emphasis Materials Science

<table>
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<td>Each summer term</td>
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**Events**

| ST 2023 | 2174596 | Polymer Engineering II | 2 SWS | Lecture / 🗣 | Liebig |

**Exams**

| ST 2023 | 76-T-MACH-102138 | Polymerengineering II | Liebig |
| WT 23/24 | 76-T-MACH-102138 | Polymerengineering II | Liebig |

Legend: 🖥 Online, 📦 Blended (On-Site/Online), 🗣 On-Site, ✗ Cancelled

**Competence Certificate**

Oral exam, about 25 minutes

**Prerequisites**

none

**Recommendation**

Knowledge in Polymerengineering I

Below you will find excerpts from events related to this course:

**Polymer Engineering II**

2174596, SS 2023, 2 SWS, Language: German, [Open in study portal](#)
Content
1. Processing of polymers
2. Properties of polymer components
Based on practical examples and components
2.1 Selection of material
2.2 Component design
2.3 Tool engineering
2.4 Production technology
2.5 Surface engineering
2.6 Sustainability, recycling

Learning objectives:
The field of Polymer Engineering includes synthesis, material science, processing, construction, design, tool engineering, production technology, surface engineering and recycling. The aim is, that the students gather knowledge and technical skills to use the material "polymer" meeting its requirements in an economical and ecological way.

The students
- can describe and classify different processing techniques
- and can exemplify mould design principles based on technical parts.
- know about practical applications and processing of polymer parts
- are able to design polymer parts according to given restrictions
- can choose appropriate polymers based on the technical requirements
- can decide how to use polymers regarding the production, economical and ecological requirements

Requirements:
Polymerengineering I

Workload:
The workload for the lecture Polymerengineering II is 120 h per semester and consists of the presence during the lecture (21 h) as well as preparation and rework time at home (99 h).

Literature
Literaturhinweise, Unterlagen und Teilmanuskript werden in der Vorlesung ausgegeben.
Recommended literature and selected official lecture notes are provided in the lecture.
8.197 Course: Power Generation [T-ETIT-101924]

Responsible:  Dr.-Ing. Bernd Hoferer
Organisation:  KIT Department of Electrical Engineering and Information Technology
Part of:  M-ETIT-101165 - Energy Generation and Network Components

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Events

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Exams

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Prerequisites

none
8.198 Course: Power Network [T-ETIT-100830]

**Responsible:** Prof. Dr.-Ing. Thomas Leibfried

**Organisation:** KIT Department of Electrical Engineering and Information Technology

**Part of:** M-ETIT-102379 - Power Network

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**Events**

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**Exams**

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**Legend:** 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✗ Cancelled
### 8.199 Course: Practical Seminar: Digital Services [T-WIWI-110888]

**Responsible:** Prof. Dr. Gerhard Satzger  
Prof. Dr. Christof Weinhardt

**Organisation:** KIT Department of Economics and Management

**Part of:**  
M-WIWI-102752 - Fundamentals of Digital Service Systems  
M-WIWI-105981 - Information Systems & Digital Business

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**Legend:** 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✗ Cancelled

**Competence Certificate**

The assessment consists of a seminar paper, a presentation of the results and the contribution to the discussion. In the seminar, a maximum score of 60 points can be achieved, consisting of:

- maximum 25 points for the documentation (written examination)
- maximum 25 points for the practical assessment
- maximum 10 points for the participation during the discussion sessions

The practical seminar is passed when at least a score of 30 points is achieved.

**Prerequisites**

None

**Recommendation**

None

**Annotation**

The current range of seminar topics is announced on the following Website:  
**Course: Practical Seminar: Interactive Systems [T-WIWI-111914]**

**Responsible:** Prof. Dr. Alexander Mädche

**Organisation:** KIT Department of Economics and Management

**Part of:**
- M-WIWI-105928 - HR Management & Digital Workplace
- M-WIWI-105981 - Information Systems & Digital Business

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<td>Grade to a third</td>
<td>Each term</td>
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</table>

**Competence Certificate**

Alternative exam assessment.

The assessment of this course consists of the implementation of a practical component, the preparation of a written documentation, and active participation in the discussions.

A total of 60 points can be achieved, of which:

- maximum 25 points for the written documentation
- maximum 25 points for the practical component
- maximum 10 points for active participation in the discussions

A minimum of 30 points must be achieved to pass this course.

Please note that a practical component, such as conducting a survey or implementing an application, is also part of the course. Please refer to the institute website [issd.iism.kit.edu](http://issd.iism.kit.edu) for the current offer of practical seminar theses.
T 8.201 Course: Practical Seminar: Platform Economy [T-WIWI-112154]

**Responsible:** Prof. Dr. Gerhard Satzger
Prof. Dr. Christof Weinhardt

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-105981 - Information Systems & Digital Business

<table>
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<td>Each term</td>
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</table>

**Competence Certificate**

The assessment of this course is in form of a written documentation, a presentation of the outcome of the conducted practical components and an active participation in class. Please take into account that, beside the written documentation, also a practical component (e.g. implementation of a prototype) is part of the course. Please examine the course description for the particular tasks. The final mark is based on the graded and weighted attainments (such as the written documentation, presentation, practical work and an active participation in class).

**Prerequisites**

None.
8.202 Course: Practical Training in Basics of Microsystem Technology [T-MACH-102164]

**Responsible:** Dr. Arndt Last

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101287 - Microsystem Technology

<table>
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**Events**

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<td>Introduction to Microsystem Technology - Practical Course</td>
<td>2</td>
<td>Practical course / 🗣</td>
<td>Last</td>
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<td>Introduction to Microsystem Technology - Practical Course</td>
<td>2</td>
<td>Practical course / 🗣</td>
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<td>2143877</td>
<td>Introduction to Microsystem Technology - Practical Course</td>
<td>2</td>
<td>Practical course / 🗣</td>
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**Exams**

<table>
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<th>Code</th>
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<td>Practical Training in Basics of Microsystem Technology</td>
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<tr>
<td>WT 23/24</td>
<td>76-T-MACH-102164</td>
<td>Practical Training in Basics of Microsystem Technology</td>
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</table>

**Legend:** 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✗ Cancelled

**Competence Certificate**
The assessment consists of a written exam

**Prerequisites**
none

*Below you will find excerpts from events related to this course:*

**Introduction to Microsystem Technology - Practical Course**

2143875, SS 2023, 2 SWS, Language: German, [Open in study portal](#)

**Practical course (P)**

**On-Site**

**Content**
In the practical training includes ten experiments:

1. Röntgenoptik
2. UVL + REM
3. Mischerbauteil
4. Rasterkraftmikroskopie
5. 3D-Printing
6. Lichtstreuung an Chrommasken
7. Abformung
8. SAW-Biosensorik
9. Nano3D-Drucker - Materialtransfer dünnster Schichten
10. Elektrospinning

Each student takes part in only four experiments.
The experiments are carried out at real workstations at the IMT and coached by IMT-staff.

**Organizational issues**
Das Praktikum findet in den Laboren des IMT am CN statt. Treffpunkt: Bau 301, vor dem Eingang.

Teilnahmeanfragen an arndt.last@kit.edu
Introduction to Microsystem Technology - Practical Course
2143877, SS 2023, 2 SWS, Language: German, Open in study portal

Practical course (P) On-Site

Content
In the practical training includes nine experiments:
1. X-ray optics
2. UVL + REM
3. Micromixer
4. Atomic force microscopy
5. 3D-Printing
6. Light dirffraction at Chromium masks
7. Moulding
8. SAW-bio-sensors
9. Nano3D-printer - material transfer of thin foils
10. Electro spinning

Each student takes part in only four experiments.
The experiments are carried out at real workstations at the IMT and coached by IMT-staff.

Organizational issues
Das Praktikum findet in den Laboren des IMT am KIT-CN statt. Treffpunkt: Eingang Bau 301.

Teilnahmeanfragen an Dr. A. Last, arndt.last@kit.edu

Literature
Menz, W., Mohr, J.: Mikrosystemtechnik für Ingenieure, VCH-Verlag, Weinheim, 1997
Unterlagen zum Praktikum zur Vorlesung 'Grundlagen der Mikrosystemtechnik'
Course: Problem Solving, Communication and Leadership [T-WIWI-102871]

**8.203 Course: Problem Solving, Communication and Leadership [T-WIWI-102871]**

- **Responsible:** Prof. Dr. Hagen Lindstädt
- **Organisation:** KIT Department of Economics and Management
- **Part of:**
  - M-WIWI-101425 - Strategy and Organization
  - M-WIWI-101513 - Human Resources and Organizations

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<td>Each summer term</td>
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<td>ST 2023</td>
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<td>Problem solving, communication and leadership</td>
<td>1 SWS</td>
<td>Each summer term</td>
<td>Lindstädt</td>
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**Exams**

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<td>7900068</td>
<td>Problem Solving, Communication and Leadership</td>
<td>Lindstädt</td>
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<tr>
<td>WT 23/24</td>
<td>7900070</td>
<td>Problem Solving, Communication and Leadership</td>
<td>Lindstädt</td>
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</table>

**Legend:**
- 🖥 Online
- 🧩 Blended (On-Site/Online)
- 🗣 On-Site
- ✗ CANCELLED

**Competence Certificate**
The assessment consists of a written exam (30 minutes) (following §4(2), 1 of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

**Prerequisites**
None

**Below you will find excerpts from events related to this course:**

- Problem solving, communication and leadership
  - Course Code: 2577910, SS 2023, 1 SWS, Language: German, Open in study portal
  - Lecture (V)
  - On-Site
Content
The course highlights the aspects of problem solving and communication by first providing a structured look at how problem solving processes work. Participants will be empowered to identify, structure, analyze and communicate problems effectively. In addition, they are introduced to precise concepts for systematically structuring problem-solving processes. They learn how to apply and analyze structured communication in diagrams and presentations.

In addition, the course teaches key leadership concepts and frameworks that address the influence of situation, leadership personality and characteristics of those being led. Driven by current and practical perspectives, the course thus aims to teach cross-disciplinary skills.

In addition, through intensive interaction via selected case studies, participants are prepared for the practical application of what they have learned in various professional contexts.

Structure
The lectures of the course are available to students online as recordings, while the course dates are reserved for active discussion of practice-relevant case studies.

Learning Objectives
Upon completion of the course, students will be able to,
- structure problem-solving processes,
- apply the principles of goal-oriented communication in diagrams and presentations,
- Understand leadership decisions and place them in the context of situation and personality.

Recommendations:
None.

Workload:
- Total workload for 2 credit hours: approximately 30’2 hours.
- Thereof attendance time: 12-14 hours
- Remainder for preparation and post-processing as well as exam preparation.

Evidence:
Depending on further pandemic developments, the exam will be offered in the summer semester 2021 either as an open-book exam (exam performance of other kind according to SPO § 4 Abs. 2, Pkt. 3), or as a 60-minute written exam (written exam according to SPO § 4 Abs. 2, Pkt. 1).

It is expected that the exam will take place at the beginning of the semester’s lecture-free period.

The examination is offered every semester and can be repeated at any regular examination date.

Organizational issues
Blockveranstaltung. Termine werden bekannt gegeben

Literature
Verpflichtende Literatur:
Die relevanten Auszüge und zusätzlichen Quellen werden in der Veranstaltung bekannt gegeben.

Ergänzende Literatur:
- Zelazny, Gene; Delker, Christel: Wie aus zahlen Bilder werden, 6. Aufl. Wiesbaden 2008
- Minto, Barbara: Das Prinzip der Pyramide: Ideen klar, verständlich und erfolgreich kommunizieren. 2005
8.204 Course: Procedures of Remote Sensing [T-BGU-103542]

**Responsible:** Dr.-Ing. Uwe Weidner

**Organisation:** KIT Department of Civil Engineering, Geo and Environmental Sciences

**Part of:** M-WIWI-104838 - Introduction to Natural Hazards and Risk Analysis

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<th>Grading scale</th>
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Industrial Engineering and Management B.Sc.
Module Handbook as of 04/10/2023
### 8.205 Course: Procedures of Remote Sensing, Prerequisite [T-BGU-101638]

<table>
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<td>Practice / 🗣</td>
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**Responsible:** Dr.-Ing. Uwe Weidner  
**Organisation:** KIT Department of Civil Engineering, Geo and Environmental Sciences  
**Part of:** M-WIWI-104838 - Introduction to Natural Hazards and Risk Analysis

**Prerequisites**  
None

**Recommendation**  
None

**Annotation**  
None
8.206 Course: Process Fundamentals by the Example of Food Production [T-CIWVT-106058]

Responsible: PD Dr. Volker Gaukel
Organisation: KIT Department of Chemical and Process Engineering
Part of: M-WIWI-101839 - Additional Fundamentals of Engineering

<table>
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Events

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<td>Lecture / 🗣️</td>
<td>Gaukel</td>
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Exams

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<th>Credits</th>
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<td>Process fundamentals by the example of food production</td>
<td>Gaukel</td>
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<td>WT 23/24 7220007</td>
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<tr>
<td>Process fundamentals by the example of food production</td>
<td>Gaukel</td>
<td></td>
<td></td>
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</table>

Legend: 🖥 Online, 🩳 Blended (On-Site/Online), 🗣️ On-Site, ✗ Cancelled

Prerequisites
none
8.207 Course: Product- and Production-Concepts for Modern Automobiles [T-MACH-110318]

**Responsible:** Dr. Stefan Kienzle  
Dr. Dieter Steegmüller

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-106590 - Production Engineering

<table>
<thead>
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<td>Each winter term</td>
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### Events

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<td>Product- and Production-Concepts for modern Automobiles</td>
<td>2</td>
<td>Lecture / Blended (On-Site/Online)</td>
<td>Steegmüller, Kienzle</td>
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### Exams

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<th>Code</th>
<th>Module</th>
<th>Type</th>
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<td>WT 23/24</td>
<td>76-T-MACH-110318</td>
<td>Product- and Production-Concepts for modern Automobiles</td>
<td>Oral Exam (20 min)</td>
<td>Steegmüller, Kienzle</td>
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**Legend:**  
🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✗ Cancelled

### Competence Certificate

Oral Exam (20 min)

### Prerequisites

T-MACH-105166 - Materials and Processes for Body Lightweight Construction in the Automotive Industry must not have been started.

Below you will find excerpts from events related to this course:

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<th>Recurrence</th>
<th>Version</th>
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<td>Product- and Production-Concepts for modern Automobiles</td>
<td>Lecture (V)</td>
<td>2 SWS</td>
<td>Grade to a third</td>
<td>Each winter term</td>
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**Legend:**  
🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✗ Cancelled
Content
The lecture illuminates the practical challenges of modern automotive engineering. As former leaders of the automotive industry, the lecturers refer to current aspects of automotive product development and production.

The aim is to provide students with an overview of technological trends in the automotive industry. In this context, the course also focuses on changes in requirements due to new vehicle concepts, which may be caused by increased demands for individualisation, digitisation and sustainability. The challenges that arise in this context will be examined from both a production technology and product development perspective and will be illustrated with practical examples thanks to the many years of industrial experience of both lecturers.

The topics covered are:

- General conditions for vehicle and body development
- Integration of new drive technologies
- Functional requirements (crash safety etc.), also for electric vehicles
- Development Process at the Interface Product & Production, CAE/Simulation
- Energy storage and supply infrastructure
- Aluminium and lightweight steel construction
- FRP and hybrid parts
- Battery, fuel cell and electric motor production
- Joining technology in modern car bodies
- Modern factories and production processes, Industry 4.0.

Learning Outcomes:
The students ...

- are able to name the presented general conditions of vehicle development and are able to discuss their influences on the final product using practical examples.
- are able to name the various lightweight approaches and identify possible areas of application.
- are able to identify the different production processes for manufacturing lightweight structures and explain their functions.
- are able to perform a process selection based on the methods and their characteristics.

Workload:
regular attendance: 25 hours
self-study: 95 hours

Organizational issues
Termine werden über Ilias bekannt gegeben.
Bei der Vorlesung handelt es sich um eine Blockveranstaltung. Eine Anmeldung über Ilias ist erforderlich.
Zur Vertiefung des im Rahmen der Lehrveranstaltung erworbenen Wissens werden die theoretischen Vorlesungseinheiten durch Praxiseinheiten im Umfeld der Karlsruher Forschungsfabrik (https://www.karlsruher-forschungsfabrik.de) unterstützt.

The lecture is a block course. An application in Ilias is mandatory.

The theoretical lectures are complemented by practical lectures in the Karlsruhe Research Factory (https://www.karlsruher-forschungsfabrik.de/en.html) to deepen the acquired knowledge.

Literature
Medien:
Skript zur Veranstaltung wird über (https://ilias.studium.kit.edu/) bereitgestellt.

Media:
Lecture notes will be provided in Ilias (https://ilias.studium.kit.edu/).
Course: Product Lifecycle Management [T-MACH-105147]

**Responsibility:** Prof. Dr.-Ing. Jivka Ovtcharova

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101270 - Product Lifecycle Management

<table>
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<tr>
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<th>Recurrence</th>
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**Exams**

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<th>76-T-MACH-105147 Product Lifecycle Management</th>
<th>Ovtcharova, Elstermann</th>
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<tbody>
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<td>ST 2023</td>
<td>76-T-MACH-105147 Product Lifecycle Management</td>
<td>Ovtcharova, Elstermann</td>
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</table>

**Type:** Written examination

**Credits:** 4

**Grading scale:** Grade to a third

**Recurrence:** Each winter term

**Version:** 2

**Competence Certificate**

Written examination 90 min.

**Prerequisites**

None

**Below you will find excerpts from events related to this course:**

**Product Lifecycle Management**

2121350, WS 23/24, 2 SWS, Language: German, [Open in study portal](#)

**Lecture (V)**

On-Site

**Content**

The course includes:

- Basics for product data management and data exchange
- IT system solutions for Product Lifecycle Management (PLM)
- Economic viability analysis and implementation problems
- Illustrative scenario for PLM using the example of the institute's own I4.0Lab

After successful attendance of the course, students can:

- identify the challenges of data management and exchange and describe solution concepts for these challenges.
- clarify the management concept PLM and its goals and highlight the economic benefits.
- explain the processes required to support the product life cycle and describe the most important business software systems (PDM, ERP, ...) and their functions.
Literature
Vorlesungsfolien.


8.209 Course: Product, Process and Resource Integration in the Automotive Industry
[T-MACH-102155]

Responsible: Prof. Dr.-Ing. Sama Mbang
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101270 - Product Lifecycle Management

<table>
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Events

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<td>Lecture / Practice / Mbang</td>
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Exams

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<td>Mbang</td>
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Competence Certificate
Oral examination 20 min.

Prerequisites
None

Annotation
Limited number of participants.

Below you will find excerpts from events related to this course:

Product, Process and Resource Integration in the Automotive Industry
2123364, SS 2023, 2 SWS, Language: German, Open in study portal

Lecture / Practice (VÜ) On-Site

Content

- Overview of product development in the automotive sector (process- and work cycle, IT-Systems)
- Integrated product models in the automotive industry (product, process and resource)
- New CAx modeling methods (intelligent feature technology, templates & functional modeling)
- Automation and knowledge-based mechanism for product design and production planning
- Product development in accordance with defined process and requirement (3D-master principle, tolerance models)
- Concurrent Engineering, shared working
- Enhanced concepts: the digital and virtual factory (application of virtual technologies and methods in the product development)

Organizational issues
Blockveranstaltung

Literature
Vorlesungsfolien
Course: Production Economics and Sustainability [T-WIWI-102820]

**Responsible:** Prof. Dr. Frank Schultmann  
Dr.-Ing. Rebekka Volk

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-101437 - Industrial Production I

**Type:** Written examination  
**Credits:** 3.5  
**Grading scale:** Grade to a third  
**Recurrence:** Each winter term  
**Version:** 1

### Events

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<td>3 SWS</td>
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<td>Each winter term</td>
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**Exams**

- **ST 2023:** 7981960  
  Production Economics and Sustainability  
  Schultmann

**Competition Certificate**
The assessment consists of an oral (30 minutes) or written exam (60 minutes) (following §4(2) of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date. Depending on the respective pandemic situation, the exam may be offered as an open book exam (alternative exam assessment, following §4(2), 3 of the examination regulation).

**Below you will find excerpts from events related to this course:**

**Content**
The analysis and management of material flows on the company level and above will be the focus of this lecture. Herein, the discussion will be about cost-effective and environmentally acceptable steps to avoid, abate and recycle emissions and waste as well as ways of efficient resources handling. As methods material flow analysis (MFA), life cycle assessment (LCA) and OR methods, e.g. for decision support, are introduced.

**Topics:**
- regulations related to materials and substances  
- raw materials, reserves and their availabilities/lifetimes  
- material and substance flow analysis (MFA/SFA)  
- material related ecoprofiles, e.g. Carbon Footprint  
- LCA  
- resource efficiency  
- emission abatement  
- waste management and closed-loop recycling  
- raw material oriented production systems  
- environmental management (EMAS, ISO 14001, Ecoprofit), eco-controlling

**Organizational issues**
Seminarräum Uni-West, Geb. 06.33

**Literature**
wird in der Veranstaltung bekannt gegeben
8 COURSES

Course: Production Technology for E-Mobility [T-MACH-110984]

8.211 Course: Production Technology for E-Mobility [T-MACH-110984]

**Responsible:** Prof. Dr.-Ing. Jürgen Fleischer

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-106590 - Production Engineering

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**Competence Certificate**

*Written Exam (60 min)*

**Prerequisites**

*none*

*Below you will find excerpts from events related to this course:*

**Production Technology for E-Mobility**

2150605, SS 2023, 2 SWS, Language: German, [Open in study portal](https://www.karlsruher-forschungsfabrik.de/en.html)

**Content**

In the lecture Production Engineering for Electromobility the students should be enabled to design, select and develop production processes for the production of the components of an electric drive train (electric motor, battery cells, fuel cells) by using research-oriented teaching.

**Learning Outcomes:**

The students are able to:

- describe the structure and function of a fuel cell, an electric traction drive and a battery system.
- reproduce the process chains for the production of the components fuel cell, battery and electric traction drive.
- apply methodical tools to solve problems along the process chain.
- derive the challenges in the production of electric drives for electric mobility.
- describe the factors influencing the individual process steps on each other using the process chain of Li-ion battery cells.
- enumerate or describe the necessary process parameters to counteract the influencing factors of the process steps in Li-ion battery cell production.
- apply methodical tools to solve problems along the process chain for the production of Li-ion battery cells.
- derive the challenge of mounting and dismounting battery modules.
- derive the challenges in the production of fuel cells for use in mobility.

**Workload:**

- regular attendance: 42 hours
- self-study: 78 hours

**Organizational issues**

Zur Vertiefung des im Rahmen der Lehrveranstaltung erworbenen Wissens werden die theoretischen Vorlesungseinheiten durch Praxiseinheiten im Umfeld der Karlsruher Forschungsfabrik ([https://www.karlsruher-forschungsfabrik.de](https://www.karlsruher-forschungsfabrik.de)) unterstützt.

The theoretical lectures are complemented by practical lectures in the Karlsruhe Research Factory ([https://www.karlsruher-forschungsfabrik.de/en.html](https://www.karlsruher-forschungsfabrik.de/en.html)) to deepen the acquired knowledge.

Industrial Engineering and Management B.Sc.

Module Handbook as of 04/10/2023
Literature
Skript zur Veranstaltung wird über Ilias (https://ilias.studium.kit.edu/) bereitgestellt.
Lecture notes will be provided in Ilias (https://ilias.studium.kit.edu/)
### 8.212 Course: Production, Logistics and Information Systems [T-WIWI-111602]

**Responsible:**
- Prof. Dr. Wolf Fichtner
- Prof. Dr. Andreas Geyer-Schulz
- Prof. Dr. Alexander Mädche
- Prof. Dr. Stefan Nickel
- Prof. Dr. Frank Schultmann
- Prof. Dr. Christof Weinhardt

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-105770 - Production, Logistics and Information Systems

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Legend: 🖥 Online, ◼ Blended (On-Site/Online), 🗣️ On-Site, ❌ Cancelled

**Competence Certificate**

Written Exam. The examination is offered at the beginning of each lecture-free period. Repeat examinations are possible at any regular examination date.

Below you will find excerpts from events related to this course:

**V**

2600004, WS 23/24, 2 SWS, Open in study portal

Lecture (V)

**Responsible:** Prof. Dr.-Ing. Stefan Hinz  
Dr.-Ing. Uwe Weidner

**Organisation:** KIT Department of Civil Engineering, Geo and Environmental Sciences

**Part of:** M-WIWI-104838 - Introduction to Natural Hazards and Risk Analysis

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Course: Project Internship Additive Manufacturing: Development and Production of an Additive Component [T-MACH-110960]

**8.214 Course: Project Internship Additive Manufacturing: Development and Production of an Additive Component [T-MACH-110960]**

**Responsible:** Prof. Dr.-Ing. Frederik Zanger

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-106590 - Production Engineering

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**Exams**

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**Legend:** 🖥 Online, ⚪ Blended (On-Site/Online), 🔴 On-Site, ✗ Cancelled

**Competence Certificate**

Alternative test achievement (graded)

The competence certificate is a project work; alternative test achievement according to § 4 Abs. 2 No. 3 of the SPO. Here, the project work, the milestone-based presentation of the results in presentation form (10 min each) and a final oral examination (15 min) are included in the assessment.

**Prerequisites**

none

Below you will find excerpts from events related to this course:
Content
The lecture “Project Internship Additive Manufacturing: Development and Production of an Additive Component” combines the basics of metallic laser powder bed fusion (LPBF) with a development project in cooperation with an industrial company. The students learn the basics of the following topics in the project-related lecture:

- Influence of different process variables on the component quality of parts produced in the LPBF process
- Preparation and simulation of the LPBF process
- Production of additive metallic components
- Process monitoring and quality assurance in additive manufacturing
- Topology optimization
- CAM for subtractive rework

The topics addressed in the course will be applied practically in various workshops on the individual topics and transferred to the developmental task in self-study. Finally, the results of the elaborations are produced additively and post-processed subtractively.

Learning Outcomes:
The students...

- are able to describe the properties and applications of the additive manufacturing processes laser powder bed fusion (LPBF) and lithography assisted ceramic manufacturing (LCM).
- are able to select the appropriate manufacturing process for a technical application.
- are able to describe and implement the creation of a product along the entire additive process chain (CAD, simulation, work preparation, CAM) from the idea to the production.
- are able to discuss the development process for components that are optimized for additive manufacturing.
- are able to perform topology optimization.
- are able to simulate the additive process, compensate for process-related distortions and determine the ideal alignment on the building platform.
- are able to create necessary support structures for the additive process and to derive a building order file.
- are able to create a CAM model for the subtractive rework process of additive parts.

Workload:
regular attendance: 12 hours
self-study: 108 hours

Organizational issues

Aus organisatorischen Gründen ist die Teilnehmerzahl für die Lehrveranstaltung begrenzt. Infolgedessen wird ein Auswahlprozess stattfinden. Der Link zur Bewerbung wird in der Vorlesungsankündigung über die Homepage des wbk (http://www.wbk.kit.edu/studium-und-lehre.php) zur Verfügung gestellt.

Literature
Skript zur Veranstaltung wird über Ilias (https://ilias.studium.kit.edu/) bereitgestellt
Lecture notes will be provided in Ilias (https://ilias.studium.kit.edu/)
8.215 Course: Project Management [T-BGU-101675]

**Responsible:** Prof. Dr.-Ing. Shervin Haghsheno

**Organisation:** KIT Department of Civil Engineering, Geo and Environmental Sciences

**Part of:** M-BGU-101004 - Fundamentals of Construction

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**Competence Certificate**

written exam with 60 minutes

**Prerequisites**

None

**Recommendation**

None

**Annotation**

None

Below you will find excerpts from events related to this course:

**Project Management**

6200106, WS 23/24, 2 SWS, Language: German, Open in study portal

**Lecture / Practice (VÜ)**

On-Site

**Content**

The module provides an introduction to construction project management. Here, the organization and delivery of a construction project from the owner's perspective is dealt with in more detail. In this context, various competencies are presented that should be available for the implementation of successful project management. In addition, selected project management methods for individual competencies are presented and applied in the context of case studies.

**Organizational issues**

Vorlesungen: Mittwochs (26.10.2022 bis 08.02.2023), jeweils 09:45 – 11:15 Uhr (hybrid - Raum: siehe ILIAS-Kurs)


**Literature**

Ahrens, Hannsjörg; Bastian, Klemens; Muchowski, Lucian (Hrsg.) (2021) Handbuch Projektsteuerung - Baumanagement: Ein praxisorientierter Leitfaden mit zahlreichen Hilfsmitteln und Arbeitsunterlagen, 6. Auflage, Fraunhofer IRB Verlag, Stuttgart

GPM Deutsche Gesellschaft für Projektmanagement e. V. (Hrsg.) (2017) Individual Competence Baseline für Projektmanagement (Version 4.0), 1. Auflage, GPM Deutsche Gesellschaft für Projektmanagement e. V., Nürnberg

Haghsheno, Shervin; John, Paul Christian (2022) Bau-Projektmanagement in Deutschland (Skriptum)


8.216 Course: Project Workshop: Automotive Engineering [T-MACH-102156]

**Responsible:** Dr.-Ing. Michael Frey  
Prof. Dr. Frank Gauterin  
Dr.-Ing. Martin Gießler

**Organisation:** KIT Department of Mechanical Engineering

**Part of:**  
M-MACH-101264 - Handling Characteristics of Motor Vehicles  
M-MACH-101265 - Vehicle Development  
M-MACH-101266 - Automotive Engineering

### Type Credits Grading scale Recurrence Version
Oral examination 4.5 Grade to a third Each term 1

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**Competence Certificate**  
Oral examination  
Duration: 30 up to 40 minutes  
Auxiliary means: none

**Prerequisites**  
none

**Below you will find excerpts from events related to this course:**

---

**Project Workshop: Automotive Engineering**  
2115817, SS 2023, 3 SWS, Language: German, Open in study portal

**Content**  
During the Project Workshop Automotive Engineering a team of six persons will work on a task given by an German industrial partner using the instruments of project management. The task is relevant for the actual business and the results are intended to be industrialized after the completion of the project workshop.

The team will generate approaches in its own responsibility and will develop solutions for practical application. Coaching will be supplied by both, company and institute.

At the beginning in a start-up meeting goals and structure of the project will be specified. During the project workshop there will be weekly team meetings. Also a milestone meeting will be held together with persons from the industrial company. In a final presentation the project results will be presented to the company management and to institute representatives.

**Learning Objectives:**  
The students are familiar with typical industrial development processes and working style. They are able to apply knowledge gained at the university to a practical task. They are able to analyze and to judge complex relations. They are ready to work self-dependently, to apply different development methods and to work on approaches to solve a problem, to develop practice-oriented products or processes.

**Organizational issues**  
Begrenzte Teilnehmerzahl mit Auswahlverfahren, die Bewerbungen sind am Ende des vorhergehenden Semesters einzureichen.

Raum und Termine: s. Aushang bzw. Homepage
Skripte werden beim Start-up Meeting ausgegeben.

**Project Workshop: Automotive Engineering**
2115817, WS 23/24, 3 SWS, Language: German, [Open in study portal]

**Content**
During the Project Workshop Automotive Engineering a team of six persons will work on a task given by an German industrial partner using the instruments of project management. The task is relevant for the actual business and the results are intended to be industrialized after the completion of the project workshop.

The team will generate approaches in its own responsibility and will develop solutions for practical application. Coaching will be supplied by both, company and institute.

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**Learning Objectives:**
During the Project Workshop Automotive Engineering a team of six persons will work on a task given by an German industrial partner using the instruments of project management. The task is relevant for the actual business and the results are intended to be industrialized after the completion of the project workshop.

The team will generate approaches in its own responsibility and will develop solutions for practical application. Coaching will be supplied by both, company and institute.

At the beginning in a start-up meeting goals and structure of the project will be specified. During the project workshop there will be weekly team meetings. Also a milestone meeting will be held together with persons from the industrial company. In a final presentation the project results will be presented to the company management and to institute representatives.

**Organizational issues**
Begrenzte Teilnehmerzahl mit Auswahlverfahren, in deutscher Sprache. Bewerbungen sind am Ende des vorhergehenden Semesters einzureichen.
Termin und Raum: siehe Institutshomepage.

Limited number of participants with selection procedure, in German language. Please send the application at the end of the previous semester.
Date and room: see homepage of institute.

**Literature**

Skripte werden beim Start-up Meeting ausgegeben.
The scripts will be supplied in the start-up meeting.
Course: Public Economics [T-WIWI-112721]

**Responsible:** Prof. Dr. Berthold Wigger  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101403 - Public Finance

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**Legend:** 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✗ Cancelled

**Competence Certificate**
Depending on the further pandemic development the assessment will consist either of an open book exam, or of an 1h written exam.

**Prerequisites**
None

**Annotation**
The lecture will be held in English in the summer semester 2023.
### 8.218 Course: Public Law I & II [T-INFO-110300]

**Responsible:** N.N.  
**Organisation:** KIT Department of Informatics  
**Part of:** M-INFO-105084 - Public and Civil Law

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<td></td>
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</tbody>
</table>

**Legend:** 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ❌ Cancelled
8.219 Course: Public Revenues [T-WIWI-102739]

**Type**: Written examination
**Credits**: 4.5
**Grading scale**: Grade to a third
**Recurrence**: Each summer term
**Version**: 1

---

**Events**

<table>
<thead>
<tr>
<th>Event</th>
<th>Code</th>
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<td>2560120</td>
<td>Public Revenues</td>
<td>2 SWS</td>
<td>Lecture</td>
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<td>2560121</td>
<td>Übung zu Öffentliche Einnahmen</td>
<td>1 SWS</td>
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**Exams**

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<td>Public Revenues</td>
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<td>790oeff</td>
<td>Public Revenues</td>
<td></td>
<td>Wigger</td>
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</tbody>
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**Competence Certificate**

Depending on the further pandemic development the assessment will consist either of an open book exam (following Art. 4, para. 2, clause 3 of the examination regulation), or of an 1h written exam (following Art. 4, para. 2, clause 1 of the examination regulation).

**Prerequisites**

None

**Recommendation**

Basic knowledge of Public Finance is required.

---

Below you will find excerpts from events related to this course:

**Public Revenues**

2560120, SS 2023, 2 SWS, Language: German, Open in study portal

---

**Content**

The **Public Revenues** lecture is concerned with the theory and policy of taxation and public dept. In the first chapter, fundamental concepts of taxation theory are introduced, whereas the second chapter deals with key elements of the German taxation system. The allocative and distributive effects of different taxation types are examined in chapter three and four. Chapter five integrates both allocative and distributive components in order to derive a theory of optimal taxation. The core of the sixth chapter is represented by international aspects of taxation. The debt part begins with a description of the extent and structure of public dept in chapter seven. In the following chapter, macroeconomic theories of national dept are evolved, while chapter nine is concerned with its long term consequences when employed as a regular instrument of budgeting. Finally, the tenth chapter deals with constitutional limits to public debt-incurring.

**Learning goals:**

See German version.

**Workload:**

The total workload for this course is approximately 135.0 hours. For further information see German version.

**Literature**

Course: Python Algorithm for Vehicle Technology [T-MACH-110796]

**Responsible:** Stephan Rhode

**Organisation:**
- M-MACH-101265 - Vehicle Development
- M-MACH-101266 - Automotive Engineering

<table>
<thead>
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<th>Version</th>
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**Events**

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<td>2 SWS</td>
<td>Lecture / 📥</td>
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<td>WT 23/24</td>
<td>Python Algorithm for Vehicle Technology</td>
<td>Rhode</td>
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</table>

**Competence Certificate**

**Written Examination**

**Duration:** 90 minutes

**Prerequisites**

none

**Below you will find excerpts from events related to this course:**

**Python Algorithms for Automotive Engineering**

2114862, SS 2023, 2 SWS, Language: German, Open in study portal

**Lecture (V) Blended (On-Site/Online)**

**Content**

**Teaching content:**

- Introduction to Python and useful tools and libraries for creating algorithms, graphical representation, optimization, symbolic arithmetic and machine learning
  - Anaconda, Pycharm, Jupyter
  - NumPy, Matplotlib, SymPy, Scikit-Learn
- Methods and tools for creating software
  - Version management GitHub, git
  - Testing software pytest, Pylint
  - Documentation Sphinx
  - Continuous Integration (CI) Travis CI
  - Workflows in Open Source and Inner Source, Kanban, Scrum
- Practical programming projects to:
  - Road sign recognition
  - Vehicle state estimation
  - Calibration of vehicle models by mathematical optimization
  - Data-based modelling of the powertrain of an electric vehicle

**Objectives:**

The students have an overview of the programming language Python and important Python libraries to solve automotive engineering problems with computer programs. The students know current tools around Python to create algorithms, to apply them and to interpret and visualize their results. Furthermore, the students know basics in the creation of software to be used in later programming projects in order to develop high-quality software solutions in teamwork. Through practical programming projects (road sign recognition, vehicle state estimation, calibration, data-based modelling), the students can perform future complex tasks from the area of driver assistance systems.

**Organizational issues**

Die 1.Vorlesung findet in Präsenz am Campus Ost, Geb. 70.04, Raum 219 statt.
Literature

- A Whirlwind Tour of Python, Jake VanderPlas, Publisher: O'Reilly Media, Inc. Release Date: August 2016, ISBN: 9781492037859 [link](#)
- Introduction to Machine Learning with Python, Sarah Guido, Andreas C. Müller, Publisher: O'Reilly Media, Inc., Release Date: October 2016, ISBN: 9781449369880, [link](#)
### Course: Quality Management [T-MACH-102107]

**Responsible:** Prof. Dr.-Ing. Gisela Lanza  
**Organisation:** KIT Department of Mechanical Engineering  
**Part of:** M-MACH-106590 - Production Engineering

<table>
<thead>
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<th>Recurrence</th>
<th>Version</th>
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**Events**

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<td>Quality Management</td>
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<td>Lecture / 🧩</td>
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</table>

**Exams**

- **ST 2023:** 76-T-MACH-102107, Quality Management, Lanza
- **WT 23/24:** 76-T-MACH-102107, Quality Management, Lanza

**Legend:** 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ❌ Cancelled

**Competence Certificate**

Written Exam (60 min)

**Prerequisites**

It is not possible to combine this brick with brick Quality Management [T-MACH-112586].

**Below you will find excerpts from events related to this course:**

<table>
<thead>
<tr>
<th>Event</th>
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<th>Title</th>
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<tr>
<td>Quality Management</td>
<td>2149667</td>
<td>WS 23/24, 2 SWS, Open in study portal</td>
<td>2</td>
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<td>Lecture (V)</td>
<td>Blended (On-Site/Online)</td>
</tr>
</tbody>
</table>
Content
Based on the quality philosophies Total Quality Management (TQM) and Six Sigma, the lecture deals with the requirements of modern quality management. Within this context, the process concept of a modern enterprise and the process-specific fields of application of quality assurance methods are presented. The lecture covers the current state of the art in preventive and non-preventive quality management methods in addition to manufacturing metrology, statistical methods and service related quality management. The content is completed with the presentation of certification possibilities and legal quality aspects.

Main topics of the lecture:
- The term “Quality”
- Total Quality Management (TQM) and Six Sigma
- Universal methods and tools
- QM during early product stages – product denition
- QM during product development and in procurement
- QM in production – manufacturing metrology
- QM in production – statistical methods
- QM in service
- Quality management systems
- Legal aspects of QM

Learning Outcomes:
The students ...
- are capable to comment on the content covered by the lecture.
- are capable of substantially quality philosophies.
- are able to apply the QM tools and methods they have learned about in the lecture to new problems from the context of the lecture.
- are able to analyze and evaluate the suitability of the methods, procedures and techniques they have learned about in the lecture for a specific problem.

Workload:
regular attendance: 21 hours
self-study: 99 hours

Organizational issues
Vorlesungstermine montags 09:45 Uhr
Übung erfolgt während der Vorlesung

Literature
Medien:
Skript zur Veranstaltung wird über (https://ilias.studium.kit.edu/) bereitgestellt:

Media:
Lecture notes will be provided in Ilias (https://ilias.studium.kit.edu/).
8.222 Course: Rail System Technology [T-MACH-102143]

**Responsible:** Prof. Dr.-Ing. Martin Cichon  
**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101274 - Rail System Technology

<table>
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<th>Recurrence</th>
<th>Version</th>
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<td>ST 2023 2115919 Rail System Technology 2 SWS Lecture / On-Site Cichon</td>
<td>9</td>
<td>Each term</td>
<td>3</td>
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<tr>
<td>ST 2023 2115996 Rail Vehicle Technology 2 SWS Lecture / On-Site Cichon</td>
<td>9</td>
<td>Each term</td>
<td>3</td>
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<tr>
<td>WT 23/24 2115919 Rail System Technology 2 SWS Lecture / On-Site Cichon, Heckele</td>
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<tr>
<td>WT 23/24 2115996 Rail Vehicle Technology 2 SWS Lecture / On-Site Cichon, Reimann</td>
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<tr>
<td>WT 23/24 76-T-MACH-102143 Rail System Technology</td>
<td>9</td>
<td>Each term</td>
<td>3</td>
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</table>

**Competence Certificate**

Oral examination  
Duration: ca. 45 minutes  
No tools or reference materials may be used during the exam.

**Prerequisites**

none

Below you will find excerpts from events related to this course:

**Rail System Technology**

2115919, SS 2023, 2 SWS, Language: German, Open in study portal

**Content**

1. Railway System: railway as system, subsystems and interdependencies, definitions, laws, rules, railway and environment, economic impact  
2. Operation: Transportation, public transport, regional transport, long-distance transport, freight service, scheduling  
3. Infrastructure: rail facilities, track alignment, railway stations, clearance diagram  
4. Wheel-rail-contact: carrying of vehicle mass, adhesion, wheel guidance, current return  
5. Vehicle dynamics: tractive and brake effort, driving resistance, inertial force, load cycles  
6. Signaling and Control: operating procedure, succession of trains, European Train Control System, blocking period, automatic train control  
7. Traction power supply: power supply of rail vehicles, comparison electric traction and diesel traction, dc and ac networks, system pantograph and contact wire, filling stations

**Literature**

Eine Literaturliste steht den Studierenden auf der Ilias-Plattform zum Download zur Verfügung.  
A bibliography is available for download (Ilias-platform).

**Rail Vehicle Technology**

2115996, SS 2023, 2 SWS, Language: German, Open in study portal
Content

1. Vehicle system technology: structure and main systems of rail vehicles
2. Car body: functions, requirements, design principles, crash elements, coupling, doors and windows
3. Bogies: forces, running gears, bogies, Jakobs-bogies, active components, connection to car body, wheel arrangement
4. Drives: principles, electric drives (main components, asynchronous traction motor, inverter, with DC supply, with AC supply, without line supply, multi-system vehicles, dual mode vehicles, hybrid vehicles), non-electric drives
5. Brakes: basics, principles (wheel brakes, rail brakes, blending), brake control (requirements and operation modes, pneumatic brake, electric-pneumatic brake, emergency brake, parking brake)
6. Train control management system: definition of TCMS, bus systems, components, network architectures, examples, future trends

Literature

Eine Literaturliste steht den Studierenden auf der Ilias-Plattform zum Download zur Verfügung.

A bibliography is available for download (Ilias-platform).

---

Content

1. Railway System: railway as system, subsystems and interdependencies, definitions, laws, rules, railway and environment, economic impact
2. Operation: Transportation, public transport, regional transport, long-distance transport, freight service, scheduling
3. Infrastructure: railway facilities, track alignment, railway stations, clearance diagram
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Literature

Eine Literaturliste steht den Studierenden auf der Ilias-Plattform zum Download zur Verfügung.

A bibliography is available for download (Ilias-platform).
8.223 Course: Remote Sensing, Exam [T-BGU-101636]

**Responsible:**  Prof. Dr.-Ing. Stefan Hinz  
Dr.-Ing. Uwe Weidner  

**Organisation:**  KIT Department of Civil Engineering, Geo and Environmental Sciences  

**Part of:**  M-WIWI-104838 - Introduction to Natural Hazards and Risk Analysis

<table>
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<th>Type</th>
<th>Recurrence</th>
<th>Version</th>
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<td>ST 2023 6020241 Remote Sensing Systems 1 SWS Lecture / 🗣  Hinz, Cermak</td>
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<td>ST 2023 6020242 Systems of Remote Sensing, Excercise 1 SWS Practice / 🗣  N.N.</td>
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<td>ST 2023 6020243 Procedures of Remote Sensing 2 SWS Lecture / 🗣  Weidner</td>
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<td>ST 2023 6020244 Procedures of Remote Sensing, Excercise 1 SWS Practice / 🗣  Weidner</td>
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<th>Recurrence</th>
<th>Version</th>
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**Exams**

**Recommendation**

None

**Responsible:** PD Dr. Patrick Jochem

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-101464 - Energy Economics

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<td>Each winter term</td>
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### Events

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<td>Each winter term</td>
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### Exams

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<th>Credits</th>
<th>Type</th>
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<th>Credits</th>
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<td>Written examination</td>
<td>Each winter term</td>
<td>2 SWS</td>
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<tr>
<td>WT 23/24</td>
<td>7981012</td>
<td>Written examination</td>
<td>Each winter term</td>
<td>2 SWS</td>
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</table>

**Competence Certificate**

The assessment consists of a written exam (60 minutes, in English, answers are possible in German or English) (following §4(2) of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date. Depending on the respective pandemic situation, the exam may be offered as an open book exam (alternative exam assessment, following §4(2), 3 of the examination regulation).

### Prerequisites

None.

**Below you will find excerpts from events related to this course:**

**Renewable Energy – Resources, Technologies and Economics**

2581012, WS 23/24, 2 SWS, Language: English, [Open in study portal](#)

<table>
<thead>
<tr>
<th>Lecture (V)</th>
<th>Type</th>
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<tbody>
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<td>On-Site</td>
<td></td>
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</tbody>
</table>

### Content

1. General introduction: Motivation, Global situation
2. Basics of renewable energies: Energy balance of the earth, potential definition
3. Hydro
4. Wind
5. Solar
6. Biomass
7. Geothermal
8. Other renewable energies
9. Promotion of renewable energies
10. Interactions in systemic context
11. Excursion to the "Energieberg" in Mühlburg

**Learning Goals:**

The student must

- understand the motivation and the global context of renewable energy resources.
- gain detailed knowledge about the different renewable resources and technologies as well as their potentials.
- understand the systemic context and interactions resulting from the increased share of renewable power generation.
- understand the important economic aspects of renewable energies, including electricity generation costs, political promotion, and marketing of renewable electricity.
- be able to characterize and where required calculate these technologies.

### Organizational issues

Blockveranstaltung, freitags 14:00-17:00 Uhr, 27.10., 10.11., 24.11., 08.12., 19.01., 26.01. 09.02.
Literature
Weiterführende Literatur:

8.225 Course: Seminar Application of Artificial Intelligence in Production [T-MACH-112121]

**Responsible:** Prof. Dr.-Ing. Jürgen Fleischer  
**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-106590 - Production Engineering

<table>
<thead>
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<th>Grading scale</th>
<th>Recurrence</th>
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<td>Grade to a third</td>
<td>Each summer term</td>
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**Events**

| ST 2023 | 2150910 | Seminar Application of Artificial Intelligence in Production | 2 SWS | Seminar / 🧱 | Fleischer |

**Exams**

| ST 2023 | 76-T-MACH-112121 | Seminar Application of Artificial Intelligence in Production | Fleischer |

**Competence Certificate**  
Alternative test achievement (graded):

- Presentation of the results (approx. 20 min) followed by a colloquium (approx. 15 min) with weighting 75%
- Written processing of the results with weighting 25%

**Prerequisites**

none

*Below you will find excerpts from events related to this course:*
Content
The module AI in Production is designed to teach students the practical, holistic integration of machine learning methods and the application of artificial intelligence in production. The course is oriented towards the phases of the CRISP-DM process with the aim of developing a deep understanding of the necessary steps and content-related aspects (methods) within the individual phases. In addition to teaching the practical aspects of integrating the most important machine learning methods, the focus here is primarily on the necessary steps for data generation and data preparation as well as the implementation and validation of the methods in an industrial environment.

The lecture “Seminar Application of Artificial Intelligence in Production” aims at the practical integration of current machine learning methods based on realistic industrial use cases. The content framework of the lecture results from the holistic, practical implementation of an AI project in production. First, the necessary Deep Learning programming basics are taught using the Keras software package. Subsequently, practice-relevant use cases are defined, which are to be implemented practically with the methods of machine learning and especially deep learning.

Learning Outcomes:
The Students
- are able to independently analyze a practical problem in production with regard to the application of machine learning methods.
- will be able to independently apply common deep learning algorithms to practical data sets, validate them, and analyze the results.
- understand the challenges of using deep learning methods in production.
- will know the main action areas and open research questions for the successful implementation of AI in production and for the implementation of autonomous machines.
- are able to evaluate the results of current deep learning methods and, based on these, to develop and practically apply proposed solutions (from the field of machine learning).

Workload:
regular attendance: 21 hours
self-study: 99 hours

Organizational issues
Das Seminar wird erstmals im SS 2023 angeboten.
Zur Vertiefung des im Rahmen der Lehrveranstaltung erworbenen Wissens werden die theoretischen Vorlesungseinheiten durch Praxiseinheiten im Umfeld der Karlsruher Forschungsfabrik (https://www.karlsruher-forschungsfabrik.de) unterstützt.

The theoretical lectures are complemented by practical lectures in the Karlsruhe Research Factory (https://www.karlsruher-forschungsfabrik.de/en.html) to deepen the acquired knowledge.

Literature
Skript zur Veranstaltung wird über Ilias (https://ilias.studium.kit.edu/) bereitgestellt.
Lecture notes will be provided in Ilias (https://ilias.studium.kit.edu/).
8.226 Course: Seminar Data-Mining in Production [T-MACH-108737]

**Responsible:** Prof. Dr.-Ing. Gisela Lanza

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-WIWI-101816 - Seminar Module

<table>
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<td>Each term</td>
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**Events**

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<th>Grading scale</th>
<th>Recurrence</th>
<th>Version</th>
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<td>Seminar / 🖥</td>
<td>Lanza</td>
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<tr>
<td>WT 23/24</td>
<td>Seminar Data Mining in Production</td>
<td>2 SWS</td>
<td>Seminar / 🗣</td>
<td>Lanza</td>
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**Exams**

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Legend: 🖥 Online, 🗣 Blended (On-Site/Online), 🗣 On-Site, ☑️ Cancelled

**Competence Certificate**

alternative test achievement (graded):

- written elaboration (workload of at least 80 h)
- oral presentation (approx. 30 min)

**Prerequisites**

none

**Annotation**

The number of students is limited to twelve. Dates and deadlines for the seminar will be announced at https://www.wbk.kit.edu/studium-und-lehre.php.

**Below you will find excerpts from events related to this course:**

**Seminar Data Mining in Production**

2151643, SS 2023, 2 SWS, Language: German, Open in study portal

**Seminar (S)**

Blended (On-Site/Online)
Content
In the age of Industry 4.0, large amounts of production data are generated by the global production networks and value chains. Their analysis enables valuable conclusions about production and lead to an increasing process efficiency. The aim of the seminar is to get to know production data analysis as an important component of future industrial projects. The students get to know the data mining tool KNIME and use it for analyses. A specific industrial use case with real production data enables practical work and offers direct references to industrial applications. The participants learn selected methods of data mining and apply them to the production data. The work within the seminar takes place in small groups on the computer. Subsequently, presentations on specific data mining methods have to be prepared.

Learning Outcomes:
The students ...
- can name, describe and distinguish between different methods, procedures and techniques of production data analysis.
- can perform basic data analyses with the data mining tool KNIME.
- can analyze and evaluate the results of data analyses in the production environment.
- are able to derive suitable recommendations for action.
- are able to explain and apply the CRISP-DM model.

Workload:
regular attendance: 10 hours
self-study: 80 hours

Organizational issues
The number of students is limited to twelve. Dates and deadlines for the seminar will be announced at https://www.wbk.kit.edu/studium-und-lehre.php.

Literature

Medien:
KNIME Analytics Platform

Media:
KNIME Analytics Platform

Seminar Data Mining in Production
2151643, WS 23/24, 2 SWS, Language: German, Open in study portal

Content
In the age of Industry 4.0, large amounts of production data are generated by the global production networks and value chains. Their analysis enables valuable conclusions about production and lead to an increasing process efficiency. The aim of the seminar is to get to know production data analysis as an important component of future industrial projects. The students get to know the data mining tool KNIME and use it for analyses. A specific industrial use case with real production data enables practical work and offers direct references to industrial applications. The participants learn selected methods of data mining and apply them to the production data. The work within the seminar takes place in small groups on the computer. Subsequently, presentations on specific data mining methods have to be prepared.

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Organizational issues

The number of students is limited to twelve. Dates and deadlines for the seminar will be announced at https://www.wbk.kit.edu/studium-und-lehre.php.

Literature
Medien:
KNIME Analytics Platform

Media:
KNIME Analytics Platform
### 8.227 Course: Seminar in Business Administration (Bachelor) [T-WIWI-103486]

**Responsible:** Professorenschaft des Fachbereichs Betriebswirtschaftslehre  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101816 - Seminar Module

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**Exams**

<p>| ST 2023 00018 | Seminar Digital Democracy – Challenges and Opportunities of the Digital Society | Weinhardt |
| ST 2023 7900003 | Seminar in Finance (Bachelor, Prof. Ruckes) | Ruckes |
| ST 2023 7900013 | Bachelor Seminar in Data Science and Machine Learning | Geyer-Schulz |
| ST 2023 7900056 | Entrepreneurship Basics (Track 1) | Terzidis |
| ST 2023 7900057 | Entrepreneurship Basics (Track 2) | Terzidis |
| ST 2023 7900058 | Student2Startup | Terzidis |
| ST 2023 7900079 | A Review of Literature Examining the Impact of AI Accuracy and Reliance on AI in Human-AI Team Performance | Satzger |
| ST 2023 7900093 | Seminar in Business Administration A | Weinhardt |
| ST 2023 7900100 | Seminar Human Resource Management (Bachelor) | Nieken |
| ST 2023 7900166 | Home Office Design Seminar: Digital Citizen Science | Mädche |
| ST 2023 7900167 | Design Seminar: Digital Citizen Science | Mädche |
| ST 2023 7900180 | Seminar in Business Administration | Weinhardt |
| ST 2023 7900190 | Engineering Seminar: Human-Centered Systems | Mädche |</p>
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Legend: 🌐 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ☑ Cancelled

**Competence Certificate**

Alternative exam assessment (§ 4(2), 3 SPO 2015). The following aspects are included:

- Regular participation in the seminar dates
- Preparation of a seminar paper on a partial aspect of the seminar topic according to scientific methods
- Lecture on the topic of the seminar paper.

The point scheme for the assessment is determined by the lecturer of the respective course. It will be announced at the beginning of the course.

**Prerequisites**

None.

**Recommendation**

See seminar description in the course catalogue of the KIT (https://campus.kit.edu/)

**Annotation**

The listed seminar titles are placeholders. Currently offered seminars of each semester will be published on the websites of the institutes and in the course catalogue of the KIT. In general, the current seminar topics of each semester are already announced at the end of the previous semester. Furthermore for some seminars there is an application required.

The available places are listed on the internet: https://portal.wiwi.kit.edu.

*Below you will find excerpts from events related to this course:*
Design Seminar: Digital Citizen Science
2500027, SS 2023, 2 SWS, Open in study portal

Content
TBA

Student2Startup
2500165, SS 2023, 2 SWS, Language: English, Open in study portal

Content
Content:
In this seminar, five pre-seed startup projects will define strategic challenges and ask students to work on solutions. Mentors from the industry will support the teams. In addition to a kick-off and final event, we will organize regular seminar sessions to provide background and help the student teams in their tasks.

Learning Objectives:
After completing this course, the course participants will be able to

- Understand and apply basic concepts of entrepreneurship, including business modeling, lean startup approaches, and market analysis
- Work in a team, organize the division of labor into separate tasks, and coordinate the tasks to attain a result
- Understand specific challenges of startup projects
- Interact with experts from the industry and potential users to develop answers/solutions to a given challenge
- Present the results to the startups and experts from the industry

Exam:
Team presentation at the final event, detailed presentation appendix with background information, and active participation in all sessions

Target group:
Bachelor students

Organizational issues
Registration is via the Wiwi-Portal.
In the seminar, you will work on a project in teams of max five people. The groups are formed in the seminar.

User-Adaptive Systems Seminar
2540553, SS 2023, 2 SWS, Language: English, Open in study portal
Content
User-adaptive systems collect and analyze biosignals from users to recognize user states as a basis for adaptation. Thermic, mechanical, electric, acoustic, and optical signals are collected using sensors which are integrated in wearables, e.g. glasses, earphones, belts, or bracelets. The collected data is processed with analytics and machine learning techniques in order to determine short-term, evolving over time, and long-term user states in the form of user characteristics, affective-cognitive states, or behavior. Finally, the recognized user states are leveraged for realizing user-centric adaptations.

In this seminar, interdisciplinary teams of students design, develop, and evaluate a user-adaptive system prototype leveraging state-of-the-art hard- and software. This seminar follows an interdisciplinary approach. Students from the fields of computer science, information systems and industrial engineering & management collaborate in the prototype design, development, and evaluation.

The seminar is carried out in cooperation between Teco/Chair of Pervasive Computing Systems (Prof. Beigl) and the Institute of Information Systems and Marketing (Research Group ISSD, Prof. Mädche). It is offered as part of the DFG-funded graduate school “KD2School: Designing Adaptive Systems for Economic Decisions” (https://kd2school.info/)

Learning objectives of the seminar
- Explain what a user-adaptive system is and how it can be conceptualized
- Suggest and evaluate different design solutions for addressing the identified problem
- Build a user-adaptive system prototype using state-of-the-art hard- and software
- Perform a user-centric evaluation of the user-adaptive system prototype

Prerequisites
Strong analytical abilities and profound software development skills are required.

Organizational issues
Termine werden bekannt gegeben

Literature
Required literature will be made available in the seminar.

Research Seminar: Human-Centered Systems
2540557, SS 2023, 3 SWS, Language: English, Open in study portal

Seminar (S)  
Blended (On-Site/Online)
Content
Formerly known as "Information Systems and Service Design Seminar"

With this seminar, we aim to provide students with the possibility to independently work on state-of-the-art research topics in addition to the knowledge gained in the lectures of the research group IS I (Prof. Mädche). The research group "Information Systems I" (IS I) headed by Prof. Mädche focuses in research, education, and innovation on designing interactive intelligent systems. It is positioned at the intersection of Information Systems and Human-Computer Interaction (HCI).

In the seminar, participants will get deeper insights in a contemporary research topic in the field of information systems, specifically interactive intelligent systems.

The actual seminar topics will be derived from current research activities of the research group. Our research assistants offer a rich set of topics from our research clusters (digital experience and participation, intelligent enterprise systems, or digital services design & innovation). Students can select among these topics individually depending on their personal interests. The seminar is carried out in the form of a literature-based thesis project. In the seminar, students will acquire the important methodological skills of running a systematic literature review.

Learning Objectives
- focus on a contemporary topic at the intersection of Information Systems and Human-Computer Interaction (HCI), specifically interactive intelligent systems
- carry out a structured literature search for a given topic
- aggregate the collected information in a suitable way to present and extract knowledge
- write a seminar thesis following academic writing standards
- deliver a presentation in a scientific context in front of an auditorium

Prerequisites
No specific prerequisites are required for the seminar.

Literature
Further literature will be made available in the seminar.

Organizational issues
Termine werden bekannt gegeben

<table>
<thead>
<tr>
<th>Entrepreneurship Basics (Track 1)</th>
<th>Seminar (S)</th>
</tr>
</thead>
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<tr>
<td>2545010, SS 2023, 2 SWS, Language: English, Open in study portal</td>
<td>On-Site</td>
</tr>
</tbody>
</table>

Content

This seminar explains important factors for becoming an entrepreneur and guides you through a structured process from the first business idea to a pitch of your final business model. Therefore, a business idea will be developed in the context of the UN Sustainable Development Goals. In small teams you create, develop, validate and present your business model. It simulates the basics of a start-up process up to the investor pitch.

Learning Objectives
After completing this course, the course participants will be able to

- Reflect on and define your personal and team core values
- Reflect on and define your personal and team competencies
- Reflect on and recall a definition for business opportunity
- Define your field of interest for opportunity recognition using the UN SDGs
- Analyze a specific domain to identify business opportunities
- Develop a first draft for your business model by using the Business Model Canvas
- Pitch / present your business idea

Exam:
Presentation + active participation + paper.

Target group:
Bachelor students
Organizational issues
Registration is via the Wiwi-Portal.
In the seminar you will work on a project in teams of max. 5 persons. The groups are formed in the seminar.

Entrepreneurship Basics (Track 2)
2545011, SS 2023, 2 SWS, Language: English, Open in study portal

Content
Course Content:
This seminar shows what is important for entrepreneurs and it guides you through a structured process from the first business idea to a pitch of your final business model. In teams you create, develop, validate and present your business model. It partially simulates a start-up process up to the investor pitch.

Starting with a rough business idea, you learn to understand and validate the customer problems. Together with your teammates and the feedback from the other teams and the lecturer, you will create a sharp business model by using tools like the Value Proposition Canvas, the Business Model Canvas and customer interviews. With some further information about rapid prototyping and structuring a pitch and a one-pager for business angels, you will learn, how to present the developed business. This seminar is teamwork. You grow as a team, learn to communicate and to work efficient in a team so all your results (the pitch and the written outline) are presented by the team.

Learning Objectives
- Learning of entrepreneurial skills.
- Understanding of value creation importance.
- Experience on how to derive and test hypothesis.
- Transition from ideas to a business model that works.
- Learning how to pitch and to convince investors.

Exam:
Presentation + active participation + paper.

Target group:
Bachelor students

Seminar Human Resources and Organizations (Bachelor)
2573010, SS 2023, 2 SWS, Language: German, Open in study portal

Content
The topics are redefined each semester on basis of current research topics. The topics will be announced on the website of the Wiwi-Portal.

Aim
The student
- looks critically into current research topics in the fields of human resources and organizations.
- trains his / her presentation skills.
- learns to get his / her ideas and insights across in a focused and concise way, both in oral and written form, and to sum up the crucial facts.
- cultivates the discussion of research approaches.

Workload
The total workload for this course is: approximately 90 hours.

Lecture: 30h
Preparation of lecture: 45h
Exam preparation: 15h

Literature
Selected journal articles and books.
Organizational issues
Geb. 05.20, Raum 2A-12.1, Termine werden bekannt gegeben

Seminar Human Resource Management (Bachelor)
2573011, SS 2023, 2 SWS, Language: German, Open in study portal

Content
The topics are redefined each semester on basis of current research topics. The topics will be announced on the website of the Wiwi-Portal.

Aim
The student
- looks critically into current research topics in the fields of Human Resource Management and Personnel Economics.
- trains his / her presentation skills.
- learns to get his / her ideas and insights across in a focused and concise way, both in oral and written form, and to sum up the crucial facts.
- cultivates the discussion of research approaches.

Workload
The total workload for this course is: approximately 90 hours.
Lecture: 30h
Preparation of lecture: 45h
Exam preparation: 15h

Literature
Selected journal articles and books.

Organizational issues
Geb. 05.20, Raum 2A-12.1; Termine werden bekannt gegeben

Seminar Management Accounting - Special Topics
2579909, SS 2023, 2 SWS, Language: English, Open in study portal

Content
The course will be a mix of lectures, discussions, and student presentations. Students will write a paper in small groups, and present this in the final week. You are to a large extent free to select your own topic. The seminar course is concentrated in four meetings that are spread throughout the semester.

Learning objectives:
- Students are largely independently able to identify a distinct topic in Management Accounting.
- Students are capable to research the topic, analyze the information, to conceptualize and deduct fundamental principles and relationships from relatively unstructured information,
- Students can afterwards logically and systematically present the results in writing and as an oral presentation, following a scientific approach (structuring, terminology, sources.

Workload:
- The total workload for this course is approximately 90 hours. For further information see German version.

Examination:
- The performance review is carried out in the form of a "Prüfungsleistung anderer Art" (following § 4 (2) No. 3 of the examination regulation), which in this case is an essay the seminar participants prepare in group work.
- The final grade of the course is the grade awarded to the paper.

Note:
- Maximum of 16 students.

Organizational issues
Geb.05.20, 2A-12.1; Termine werden bekannt gegeben

Literature
Will be announced in the course.
Seminar Management Accounting - Sustainability Topics

Content
The course will be a mix of lectures, discussions, and student presentations. Students will write a paper in small groups, and present this in the final week. Topics are selectively prediscibed. The seminar course is concentrated in several meetings that are spread throughout the semester.

Learning objectives:
- Students are largely independently able to identify a distinct topic in Management Accounting.
- Students are capable to research the topic, analyze the information, to conceptualize and deduct fundamental principles and relationships from relatively unstructured information.
- Students can afterwards logically and systematically present the results in writing and as an oral presentation, following a scientific approach (structuring, terminology, sources).

Workload:
- The total workload for this course is approximately 90 hours. For further information see German version.

Examination:
- The performance review is carried out in the form of a “Prüfungsleistung anderer Art” (following § 4 (2) No. 3 of the examination regulation), which in this case is an essay the seminar participants prepare in group work.
- The final grade of the course is the grade awarded to the paper.

Note:
- Maximum of 16 students.

Organizational issues
Geb.05.20, 2A-12.1; Termine werden bekannt gegeben

Literature
Will be announced in the course.

Entrepreneurship Seasonal School

Content
During the Entrepreneurship Seasonal School, students develop a business model based on innovative technologies and social problems in workshops in international teams for one week.

Course Content:
The Entrepreneurship Seasonal School brings together students from different universities to spend a week strengthening their knowledge of digital entrepreneurship in healthcare. Experience the life of an entrepreneur and learn how to attain resources to realize a product vision. During one week, you will develop a range of entrepreneurial competences crucial for establishing a successful venture. Our primary focus is on digital healthcare ventures, granting you the opportunity to delve into the realm of entrepreneurship within the healthcare system. By gaining a deep understanding of healthcare needs, you will utilize creativity techniques to uncover potential business ideas that provide value for patients and doctors. Additionally, you will learn how to create viable business models, dive into health regulations, and pitch your idea to a jury.

In WS 2023/24 the one-week program is being hosted by the Karlsruhe Institute of Technology, with co-teaching support from the Eucor partners University of Basel and the University of Strasbourg.

In the seminar you will work on a project in teams of max. 5 persons.

Learning Objectives:
After attending the event, you will be able to:
- describe the role of entrepreneurship
- develop innovative and technology-based solutions for societal problems,
- develop a viable business model for a problem,
- present a business idea to a panel of judges,
- and be empowered to work independently in multidisciplinary and multicultural teams.
Organizational issues
19.02.24 – 23.02.24, Details will be announced later. Registration via wiwi portal.

Content
Within this seminar eLearning videos are produced to different topics out of the contents of our lectures. The student gets in touch with scientific work. Through profound working on a specific scientific topic the student is meant to learn the foundations of scientific research and reasoning in particular in finance. Through conduction of the video the student becomes familiar with the fundamental techniques for presentations and foundations of scientific reasoning. In addition, the student earns rhetorical skills. The success is monitored by the development of an eLearning video and by the writing of a project report (according to §4(2), 3 SPO).

The overall grade is made up of these partial performances.

Recommendations:
Knowledge of the content of the modules Essentials of Finance [WW3BWLFBV1] (for bachelor students) and F1 (Finance) [WW4BWLFBV1] (for master students) is assumed.

The total workload for this course is approximately 90 hours. For further information see German version.

Organizational issues
Zwischenpräsentation am 11.12.23, 16 Uhr und Abschlusspräsentation am 23.01.24, 17:30 Uhr, beides am Campus B (Geb. 09.21), Raum 209

Content
wird auf deutsch und englisch gehalten

Organizational issues
Blockveranstaltung, siehe WWW

Bachelor Seminar in Data Science and Machine Learning
2540524, WS 23/24, 2 SWS, Language: German, Open in study portal

Literature
Weiterführende Literatur:

Entrepreneurship Basics (Track 1)
2545010, WS 23/24, 2 SWS, Language: English, Open in study portal
Content

Course Content:
This seminar explains important factors for becoming an entrepreneur and guides you through a structured process from the first business idea to a pitch of your final business model. Therefore, a business idea will be developed in the context of the UN Sustainable Development Goals. In small teams you create, develop, validate and present your business model. It simulates the basics of a start-up process up to the investor pitch.

Learning Objectives

After completing this course, the course participants will be able to

- Reflect on and define your personal and team core values
- Reflect on and define your personal and team competencies
- Reflect on and recall a definition for business opportunity
- Define your field of interest for opportunity recognition using the UN SDGs
- Analyze a specific domain to identify business opportunities
- Develop a first draft for your business model by using the Business Model Canvas
- Pitch / present your business idea

Credentials:

Registration is via the Wiwi portal.

Exam:
Presentation + active participation + paper.

Target group:
Bachelor students

Organizational issues

Registration is via the Wiwi portal.

In the seminar you will work on a project in teams of max. 5 persons. The groups are formed in the seminar.
Content
The topics are redefined each semester on basis of current research topics. The topics will be announced on the website of the Wiwi-Portal.

Aim
The student
- looks critically into current research topics in the fields of human resources and organizations.
- trains his / her presentation skills.
- learns to get his / her ideas and insights across in a focused and concise way, both in oral and written form, and to sum up the crucial facts.
- cultivates the discussion of research approaches.

Workload
The total workload for this course is: approximately 90 hours.
Lecture: 30h
Preparation of lecture: 45h
Exam preparation: 15h

Literature
Selected journal articles and books.

Organizational issues
Blockveranstaltung siehe Homepage

Seminar: Human Resource Management (Bachelor)
2573011, WS 23/24, 2 SWS, Language: German, Open in study portal

Content
The topics are redefined each semester on basis of current research topics. The topics will be announced on the website of the Wiwi-Portal.

Aim
The student
- looks critically into current research topics in the fields of Human Resource Management and Personnel Economics.
- trains his / her presentation skills.
- learns to get his / her ideas and insights across in a focused and concise way, both in oral and written form, and to sum up the crucial facts.
- cultivates the discussion of research approaches.

Workload
The total workload for this course is: approximately 90 hours.
Lecture: 30h
Preparation of lecture: 45h
Exam preparation: 15h

Literature
Selected journal articles and books.

Organizational issues
Blockveranstaltung siehe Homepage

Seminar Management Accounting - Special Topics
2579911, WS 23/24, 2 SWS, Language: English, Open in study portal
Content
The course will be a mix of lectures, discussions, and student presentations. Students will write a paper in small groups, and present this in the final week. Topics are selectively prediscibed. The seminar course is concentrated in several meetings that are spread throughout the semester.

Learning objectives:
- Students are largely independently able to identify a distinct topic in Management Accounting,
- Students are capable to research the topic, analyze the information, to conceptualize and deduct fundamental principles and relationships from relatively unstructured information,
- Students can afterwards logically and systematically present the results in writing and as an oral presentation, following a scientific approach (structuring, terminology, sources.

Examination:
- The performance review is carried out in the form of a “Prüfungsleistung anderer Art” (following § 4 (2) No. 3 of the examination regulation), which in this case is an essay the seminar participants prepare in group work.
- The final grade of the course is the grade awarded to the paper.

Required prior Courses:
- The LV "Betriebswirtschaftslehre: Finanzwirtschaft und Rechnungsweis" (2600026) must have been completed before starting this seminar.

Workload:
- The total workload for this course is approximately 90 hours. For further information see German version.

Note:
- Maximum of 12 students.

Organizational issues
Ort und Zeit werden noch bekannt gegeben bzw. über ILIAS

Literature
Will be announced in the course.

Seminar Management Accounting - Sustainability Topics
2579919, WS 23/24, 2 SWS, Language: English, Open in study portal
Content
The course will be a mix of lectures, discussions, and student presentations. Students will write a paper in small groups, and present this in the final week. Topics are selectively prediscibed. The seminar course is concentrated in several meetings that are spread throughout the semester.

Learning objectives:

- Students are largely independently able to identify a distinct topic in Management Accounting,
- Students are capable to research the topic, analyze the information, to conceptualize and deduct fundamental principles and relationships from relatively unstructured information,
- Students can afterwards logically and systematically present the results in writing and as an oral presentation, following a scientific approach (structuring, terminology, sources).

Examination:

- The performance review is carried out in the form of a "Prüfungsleistung anderer Art" (following § 4 (2) No. 3 of the examination regulation), which in this case is an essay the seminar participants prepare in group work.
- The final grade of the course is the grade awarded to the paper.

Required prior Courses:

- The LV "Betriebswirtschaftslehre: Finanzwirtschaft und Rechnungswesen" (2600026) must have been completed before starting this seminar.

Workload:

- The total workload for this course is approximately 90 hours. For further information see German version.

Note:

- Maximum of 8 students.

Organizational issues
Ort und Zeit werden noch bekannt gegeben bzw. über IILAS

Literature
Will be announced in the course.
## 8.228 Course: Seminar in Economics (Bachelor) [T-WIWI-103487]

**Responsible:** Professorenschaft des Fachbereichs Volkswirtschaftslehre  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101816 - Seminar Module

<table>
<thead>
<tr>
<th>Type</th>
<th>Credits</th>
<th>Grading scale</th>
<th>Recurrence</th>
<th>Version</th>
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<td>Grade to a third</td>
<td>Each term</td>
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### Events

<p>| ST 2023 | 2500004 | Predictive Data Analytics - An Introduction to Statistical Machine Learning | 2 SWS | Seminar / | Schienle, Lerch |
| ST 2023 | 2500009 | Seminar in Economic Theory I | 2 SWS | Seminar / | Müller, Ammann, Kretz |
| ST 2023 | 2520367 | Strategische Entscheidungen | 2 SWS | Seminar / | Ehrhart |
| ST 2023 | 2520535 | Seminar in Economic Theory I | 2 SWS | Seminar / | Müller, Ammann, Kretz |
| ST 2023 | 2560241 | Digital IT Solutions and Services transforming the Field of Public Transportation | 2 SWS | Seminar | Janoshalmi |
| ST 2023 | 2560259 | Organisation and Management of Development Projects | 2 SWS | Seminar / | Sieber |
| ST 2023 | 2560553 | Shaping AI and Digitization for Society (Bachelor) | 2 SWS | Seminar / | Zhao |
| ST 2023 | 2560554 | Bounded Rationality - Theory and Experiments (Master) | 2 SWS | Seminar / | Szech, Rau |
| ST 2023 | 2560556 | Law and Economics (Bachelor) | 2 SWS | Seminar / | Okulicz |
| ST 2023 | 2560560 | Co-Opetition: A practical perspective to game theory in the game of business (Bachelor &amp; Master) | 2 SWS | Seminar / | Rosar |
| WT 23/24 | 2500051 | Die Herausforderungen der Mobilitätswende im urbanen Bereich - welche Beiträge kann das Serious Game &quot;MobileCityGame&quot; liefern? | 2 SWS | Seminar | Szimba |
| WT 23/24 | 2520367 | Strategische Entscheidungen | Seminar | Ehrhart |
| WT 23/24 | 2520405 | Topics in Experimental Economics | Seminar / | Reiß, Peters |
| WT 23/24 | 2520561 | Wirtschaftstheoretisches Seminar I (Bachelor) | 2 SWS | Seminar / | Puppe, Ammann, Kretz |
| WT 23/24 | 2520562 | Wirtschaftstheoretisches Seminar II (Bachelor) | 2 SWS | Seminar / | Puppe, Ammann, Kretz |
| WT 23/24 | 2521310 | Topics in Econometrics | 2 SWS | Seminar | Schienle, Rüter |
| WT 23/24 | 2560130 | Seminar Public Finance | 2 SWS | Seminar / | Wigger, Setio, Schmelzer |
| WT 23/24 | 2560140 | Lying and Cheating in Economic Experiments (Bachelor) | 2 SWS | Seminar / | Rau |
| WT 23/24 | 2560141 | AI and Digitization for Society (Bachelor) | 2 SWS | Seminar / | Zhao |
| WT 23/24 | 2560145 | Disruption and the Digital Economy: Markets, Strategies, and Society (Bachelor) | 2 SWS | Seminar / | Rosar |
| WT 23/24 | 2560400 | Seminar in Macroeconomics I | 2 SWS | Seminar / | Brumm, Krause, Pegorari, Hußmann |
| WT 23/24 | 2560401 | Seminar in Macroeconomics II | 2 SWS | Seminar / | Brumm, Krause, Pegorari, Hußmann |</p>
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<tr>
<th>Semester</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Lecturer</th>
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<td>WT 23/24</td>
<td>2561208</td>
<td><strong>Selected aspects of European transport planning and -modelling</strong></td>
<td>Szimba</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>2 SWS Seminar</strong></td>
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### Exams

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<th>Course Code</th>
<th>Course Title</th>
<th>Lecturer</th>
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<td>ST 2023</td>
<td>7900051</td>
<td>Seminar in Economic Policy</td>
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<tr>
<td>ST 2023</td>
<td>7900060</td>
<td>Bounded Rationality - Theory and Experiments (Bachelor)</td>
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<td>ST 2023</td>
<td>7900130</td>
<td>Shaping AI and Digitization for Society (Bachelor)</td>
<td>Szech</td>
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<td>ST 2023</td>
<td>7900164</td>
<td>Seminar in Economics (Bachelor)</td>
<td>Mitsuch</td>
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<td>ST 2023</td>
<td>7900204</td>
<td>Predictive Data Analytics - An Introduction to Statistical Machine Learning</td>
<td>Lerch</td>
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<td>ST 2023</td>
<td>7900208</td>
<td>Law and Economics (Bachelor)</td>
<td>Szech</td>
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<tr>
<td>ST 2023</td>
<td>7900222</td>
<td>Co-Opetition (Bachelor &amp; Master)</td>
<td>Szech</td>
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<tr>
<td>ST 2023</td>
<td>7900226</td>
<td>What's up Inflation? Recent Advances in Theory and Empirics</td>
<td>Brumm</td>
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<td>ST 2023</td>
<td>7900228</td>
<td>Digitalization, AI, and the Future Economy</td>
<td>Brumm</td>
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<tr>
<td>ST 2023</td>
<td>7900257</td>
<td>Seminar: Capital in the Twenty-First Century</td>
<td>Puppe</td>
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<tr>
<td>ST 2023</td>
<td>7900258</td>
<td>Seminar: The Economics of Everything</td>
<td>Puppe</td>
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<td>ST 2023</td>
<td>7900283</td>
<td>Strategic Decisions (Bachelor)</td>
<td>Ehrhart</td>
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<td>ST 2023</td>
<td>79100003</td>
<td>Seminar Topics in Applied Microeconomics</td>
<td>Reiß</td>
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<td>ST 2023</td>
<td>79100005</td>
<td>Seminar on Topics in Experimental Economics</td>
<td>Reiß</td>
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<tr>
<td>ST 2023</td>
<td>79sefi1</td>
<td>Seminar Public Finance (Bachelor)</td>
<td>Wigger</td>
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<tr>
<td>WT 23/24</td>
<td>7900212</td>
<td>Seminar in Economic Policy</td>
<td>Ott</td>
</tr>
</tbody>
</table>

**Legend:**
- 🖥 Online
- 🧩 Blended (On-Site/Online)
- 🗣 On-Site
- ✗ Cancelled

### Competence Certificate

Alternative exam assessment (§ 4(2), 3 SPO 2015). The following aspects are included:

- Regular participation in the seminar dates
- Preparation of a seminar paper on a partial aspect of the seminar topic according to scientific methods
- Lecture on the topic of the seminar paper.

The point scheme for the assessment is determined by the lecturer of the respective course. It will be announced at the beginning of the course.

### Prerequisites

None.

### Recommendation

See seminar description in the course catalogue of the KIT (https://campus.kit.edu/)

### Annotation

The listed seminar titles are placeholders. Currently offered seminars of each semester will be published on the websites of the institutes and in the course catalogue of the KIT. In general, the current seminar topics of each semester are already announced at the end of the previous semester. Furthermore, for some seminars, there is an application required.

The available places are listed on the internet: https://portal.wiwi.kit.edu.

Below you will find excerpts from events related to this course:

- **Predictive Data Analytics - An Introduction to Statistical Machine Learning**
  - 2500004, SS 2023, 2 SWS, Language: German/English, Open in study portal
  - Seminar (S) Blended (On-Site/Online)

### Organizational issues

Blockveranstaltung. Termine werden bekannt gegeben

- **Shaping AI and Digitization for Society (Bachelor)**
  - 2560553, SS 2023, 2 SWS, Language: English, Open in study portal
  - Seminar (S) Blended (On-Site/Online)
Content
Participation will be limited to 12 students.

For Bachelor students of the fields Industrial Engineering and Management, Information Engineering and Management, Economics Engineering or Economathematics.

Objective: The student develops an own idea for an economic experiment in this research direction. Students work in groups. Changing topics each semester. For current topics, see http://politecon.kit.edu or https://portal.wiwi.kit.edu/Seminare

The acceptance of students for the seminar is based on preferences and suitability for the topics. This includes theoretical and practical experience with Behavioral Economics as well as English skills.

Seminar Papers of 8–10 pages are to be handed in.

Recommendation: Knowledge in the field of experimental economic research or behavioral economics as well as in the field of microeconomics and game theory may be helpful.

Organizational issues
Blockveranstaltung:
Introductory Meeting April 19 (online)
Seminar Presentations June 7 (in person)

Bounded Rationality - Theory and Experiments (Master)
2560554, SS 2023, 2 SWS, Language: English, Open in study portal

Content
For Master students of the fields Industrial Engineering and Management, Information Engineering and Management, Economics Engineering or Economathematics.

Objective: The student develops an own idea for an economic experiment in this research direction. Students work in groups. Changing topics each semester. For current topics, see http://politecon.kit.edu or https://portal.wiwi.kit.edu/Seminare

The acceptance of students for the seminar is based on preferences and suitability for the topics. This includes theoretical and practical experience with Behavioral Economics as well as English skills.

Seminar Papers of 8–10 pages are to be handed in.

Students’ grades will be based on the quality of presentations in the seminar (40%) and the seminar paper + individual abstract (60%). Students can improve their grades by actively participating in the discussions of the presentations.

Recommendation: Knowledge in the field of experimental economic research or behavioral economics as well as in the field of microeconomics and game theory may be helpful.

Organizational issues
Blockveranstaltung:
Introductory Meeting: April 18, at 2:45pm (in person)
Seminar Presentations (June 5) (in person)

Law and Economics (Bachelor)
2560556, SS 2023, 2 SWS, Language: English, Open in study portal

Content
Participation will be limited to 12 students.

For Master students of the fields Industrial Engineering and Management, Information Engineering and Management, Economics Engineering or Economathematics.

Objective: The student develops an own idea for an economic experiment in this research direction. Students work in groups. Changing topics each semester. For current topics, see http://politecon.kit.edu or https://portal.wiwi.kit.edu/Seminare

The acceptance of students for the seminar is based on preferences and suitability for the topics. This includes theoretical and practical experience with Behavioral Economics as well as English skills.

Seminar Papers of 8–10 pages are to be handed in.

Students’ grades will be based on the quality of presentations in the seminar (40%) and the seminar paper (40%). Additionally students will have to hand in two abstracts with different lengths (20%). Students can improve their grades by actively participating in the discussions of the presentations.

Recommendation: Knowledge in the field of experimental economic research or behavioral economics as well as in the field of microeconomics and game theory may be helpful.
Organizational issues
Blockseminar:
Kick-off 19.04.2023, 10.00 - 10.45 h (online)
Präsentation 26.05.2023, 08.00 - 13.00 (in person)

Co-Opetiton: A practical perspective to game theory in the game of business (Bachelor & Master)
2560560, SS 2023, 2 SWS, Language: English, Open in study portal

Content
Participation will be limited to 12 students.
For Master students of the fields Industrial Engineering and Management, Information Engineering and Management, Economics Engineering or Economathematics.
Objective: The student develops an own idea for an economic experiment in this research direction. Students work in groups. Changing topics each semester. For current topics, see http://polit.econ.kit.edu or https://portal.wiwi.kit.edu/Seminare
The acceptance of students for the seminar is based on preferences and suitability for the topics. This includes theoretical and practical experience with Behavioral Economics as well as English skills.
Seminar Papers of 8–10 pages are to be handed in.
Students’ grades will be based on the quality of presentations in the seminar (40%) and the seminar paper (40%). Additionally students will have to hand in two abstracts with different lengths (20%). Students can improve their grades by actively participating in the discussions of the presentations.
Recommendation: Knowledge in the field of experimental economic research or behavioral economics as well as in the field of microeconomics and game theory may be helpful.

Organizational issues
Blockseminar:
Kick-off 19.04.2023
Präsentation 22.05.2023, 14.00 - 18.30 Uhr, Geb. 10.50, Raum 604

Topics in Experimental Economics
2520405, WS 23/24, SWS, Language: English, Open in study portal

Organizational issues
(im WS2021/22 online; sonst Blockseminar; Blücherstraße 17); Termine werden separat bekannt gegeben

Literature
Als Pflichtliteratur dienen ausgewählte Paper.

Topics in Econometrics
2521310, WS 23/24, 2 SWS, Language: German, Open in study portal

Organizational issues
Blockveranstaltung. Termine werden auf Homepage und über Ilias bekannt gegeben

Lying and Cheating in Economic Experiments (Bachelor)
2560140, WS 23/24, 2 SWS, Language: English, Open in study portal

Content
For Bachelor students of the fields Industrial Engineering and Management, Information Engineering and Management, Economics Engineering or Economathematics.
Objective: The student develops an own idea for an economic experiment in this research direction. Students work in groups. Changing topics each semester. For current topics, see http://polit.econ.kit.edu or https://portal.wiwi.kit.edu/Seminare
Seminar Papers of 8–10 pages are to be handed in.
Recommendation: Knowledge in the field of experimental economic research or behavioral economics as well as in the field of microeconomics and game theory may be helpful.
**AI and Digitization for Society (Bachelor)**
2560141, WS 23/24, 2 SWS, Language: English, [Open in study portal](#)

**Seminar (S)**
Blended (On-Site/Online)

**Content**
For Bachelor students of the fields Industrial Engineering and Management, Information Engineering and Management, Economics Engineering or Economathematics.

The student develops an own idea for an economic experiment in this research direction. Students work in groups. Changing topics each semester. For current topics, see [http://polit.econ.kit.edu](http://polit.econ.kit.edu) or [https://portal.wiwi.kit.edu/Seminare](https://portal.wiwi.kit.edu/Seminare)

Seminar Papers of 8–10 pages are to be handed in.

**Recommendation:** Knowledge in the field of experimental economic research or behavioral economics as well as in the field of microeconomics and game theory may be helpful.

**Organizational issues**
Application is possible via [https://portal.wiwi.kit.edu/Seminare](https://portal.wiwi.kit.edu/Seminare)

Kick-off: 25.10.2023, 11.00 - 12.00 (online)

Presentations: 12.01.2024, 08.00 - 13.00 h, Geb. 01.85, KD2Lab (1. OG über Außentrepp), Teamraum

**Disruption and the Digital Economy: Markets, Strategies, and Society (Bachelor)**
2560145, WS 23/24, 2 SWS, Language: English, [Open in study portal](#)

**Seminar (S)**
On-Site

**Content**
For Bachelor students of the fields Industrial Engineering and Management, Information Engineering and Management, Economics Engineering or Economathematics.

Objective: The student develops an own idea for an economic experiment in this research direction. Students work in groups. Changing topics each semester. For current topics, see [http://polit.econ.kit.edu](http://polit.econ.kit.edu) or [https://portal.wiwi.kit.edu/Seminare](https://portal.wiwi.kit.edu/Seminare)

Seminar Papers of 8–10 pages are to be handed in.

**Recommendation:** Knowledge in the field of experimental economic research or behavioral economics as well as in the field of microeconomics and game theory may be helpful.

**Organizational issues**
Application is possible via [https://portal.wiwi.kit.edu/Seminare](https://portal.wiwi.kit.edu/Seminare)

Kick-off: 27.10.2023, 14.00 - 15.30 Uhr, Geb. 01.85, KD2Lab (1. OG über Außentrepp), Teamraum

Präsentationen: 15.01.2024 09.00 - 13.00 Uhr, Geb. 01.85, KD2Lab (1. OG über Außentrepp), Teamraum
8.229 Course: Seminar in Engineering Science Master (approval) [T-WIWI-108763]

**Responsible:** Fachvertreter ingenieurwissenschaftlicher Fakultäten

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-101816 - Seminar Module

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**Competence Certificate**
See German version.

**Prerequisites**
See module description.

**Recommendation**
None
### 8.230 Course: Seminar in Informatics (Bachelor) [T-WIWI-103485]

**Responsible:** Professorenschaft des Instituts AIFB  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101816 - Seminar Module

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#### Events

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<td>Seminar Data Science &amp; Real-time Big Data Analytics</td>
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#### Exams

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<td>ST 23</td>
<td>Seminar Graph Representation Learning (Bachelor)</td>
<td>Färber</td>
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<td>ST 23</td>
<td>User-adaptive Systems Seminar</td>
<td>Mädche</td>
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<tr>
<td>ST 23</td>
<td>Generative Language Models</td>
<td>Färber</td>
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Legend: 🗣️ Online, 🧩 Blended (On-Site/Online), 🗣️ On-Site, X Cancelled
Competence Certificate
Alternative exam assessment (§ 4(2), 3 SPO 2015). The following aspects are included:

- Regular participation in the seminar dates
- Preparation of a seminar paper on a partial aspect of the seminar topic according to scientific methods
- Lecture on the topic of the seminar paper.

The point scheme for the assessment is determined by the lecturer of the respective course. It will be announced at the beginning of the course.

Prerequisites
None.

Recommendation
See seminar description in the course catalogue of the KIT (https://campus.kit.edu/)

Annotation
Placeholder for seminars offered by the Institute AIFB. Currently offered seminars of each semester will be published on the websites of the institutes and in the course catalogue of the KIT. In general, the current seminar topics of each semester are already announced at the end of the previous semester. Furthermore for some seminars there is an application required.

The available places are listed on the internet: https://portal.wiwi.kit.edu.

Below you will find excerpts from events related to this course:

Seminar Knowledge Discovery and Data Mining (Bachelor)
2513308, SS 2023, 3 SWS, Language: English, Open in study portal

Content
In this seminar different machine learning and data mining methods are implemented.

The seminar includes different methods of machine learning and data mining. Participants of the seminar should have basic knowledge of machine learning and programming skills.

Domains of interest include, but are not limited to:

- Medicine
- Social Media
- Finance Market
- Scientific Publications

Further Information: https://aifb.kit.edu/web/Lehre/Praktikum_Knowledge_Discovery_and_Data_Science

The exact dates and information for registration will be announced at the event page.

Organizational issues
Die Anmeldung erfolgt über das WiWi Portal https://portal.wiwi.kit.edu/.

Für weitere Fragen bezüglich des Seminar und der behandelten Themen wenden Sie sich bitte an die entsprechenden Verantwortlichen.

Literature
Detaillierte Referenzen werden zusammen mit den jeweiligen Themen angegeben. Allgemeine Hintergrundinformationen ergeben sich z.B.aus den folgenden Lehrbüchern:

- Mitchell, T.; Machine Learning
Content
In this seminar, students will design applications in teams that use meaningful and creative Event Processing methods. Thereby, students have access to an existing record.

Event processing and real-time data are everywhere: financial market data, sensors, business intelligence, social media analytics, logistics. Many applications collect large volumes of data in real time and are increasingly faced with the challenge of being able to process them quickly and react promptly. The challenges of this real-time processing are currently also receiving a great deal of attention under the term "Big Data". The complex processing of real-time data requires both knowledge of methods for data analysis (data science) and their processing (real-time analytics). Seminar papers are offered on both of these areas as well as on interface topics, the input of own ideas is explicitly desired.

Further information to the seminar is given under the following Link:
http://seminar-cep.fzi.de

Questions are answered via the e-mail address sem-ep@fzi.de.

Organizational issues
Further information as well as the registration form can be found under the following link:
http://seminar-cep.fzi.de

Questions are answered via the e-mail address sem-ep@fzi.de.

Seminar Graph Representation Learning (Bachelor)
2513318, SS 2023, 3 SWS, Language: English, Open in study portal

Content
Graphs are a natural way to represent the information of objects and the topological relationship between them. They are the basis for various applications ranging from recommender systems, finance, social networks, and personal assistants (e.g., Alexa).

In this seminar, students will read, discuss, and work on graph algorithms based on scientific literature, including most recent methods for analyzing and creating large graphs (e.g., link prediction on knowledge graphs using graph neural networks), and methods for making the behavior of neural networks based on graphs explainable (e.g., generating text based on a subgraph).

Cognitive Automobiles and Robots
2513500, SS 2023, 2 SWS, Language: German/English, Open in study portal

Content
The seminar is intended as a theoretical supplement to lectures such as "Machine Learning". The theoretical basics will be deepened in the seminar. The aim of the seminar is that the participants work individually to analyze a subsystem from the field of robotics and cognitive systems using one or more procedures from the field of AI/ML.

The individual projects require the analysis of the task at hand, selection of suitable procedures, specification and theoretical evaluation of the approach taken. Finally, the chosen solution has to be documented and presented in a short presentation.

Learning objectives:
- Students can apply knowledge from the Machine Learning lecture in a selected field of current research in robotics or cognitive automobiles for theoretical analysis.
- Students can evaluate, document and present their concepts and results.

Recommendations:
Attendance of the lecture machine learning

Workload:
The workload of 3 credit points consists of the time spent on literature research and planning/specifying the proposed solution. In addition, a short report and a presentation of the work carried out will be prepared.

Organizational issues
Anmeldung und weitere Informationen sind im WiWi-Portal zu finden.

Registration and further information can be found in the WiWi-portal.
Content
User-adaptive systems collect and analyze biosignals from users to recognize user states as a basis for adaptation. Thermic, mechanical, electric, acoustic, and optical signals are collected using sensors which are integrated in wearables, e.g. glasses, earphones, belts, or bracelets. The collected data is processed with analytics and machine learning techniques in order to determine short-term, evolving over time, and long-term user states in the form of user characteristics, affective-cognitive states, or behavior. Finally, the recognized user states are leveraged for realizing user-centric adaptations.

In this seminar, interdisciplinary teams of students design, develop, and evaluate a user-adaptive system prototype leveraging state-of-the-art hard- and software. This seminar follows an interdisciplinary approach. Students from the fields of computer science, information systems and industrial engineering & management collaborate in the prototype design, development, and evaluation.

The seminar is carried out in cooperation between Teco/Chair of Pervasive Computing Systems (Prof. Beigl) and the Institute of Information Systems and Marketing (Research Group ISSD, Prof. Mädche). It is offered as part of the DFG-funded graduate school “KD2School: Designing Adaptive Systems for Economic Decisions” (https://kd2school.info/)

Learning objectives of the seminar
- Explain what a user-adaptive system is and how it can be conceptualized
- Suggest and evaluate different design solutions for addressing the identified problem
- Build a user-adaptive system prototype using state-of-the-art hard- and software
- Perform a user-centric evaluation of the user-adaptive system prototype

Prerequisites
Strong analytical abilities and profound software development skills are required.

Organizational issues
Termine werden bekannt gegeben

Literature
Required literature will be made available in the seminar.

Machine Learning on Graphs (Bachelor)
2500046, WS 23/24, SWS, Language: English, Open in study portal

Content
Graph representation learning deals with capturing and understanding the complex relationships and patterns inherent in graph-structured data. It focuses on developing techniques and algorithms to extract meaningful representations from graphs, enabling tasks such as node classification, link prediction, community detection, and graph generation. This seminar will cover the fundamental concepts of graph representation learning, such as knowledge graphs, graph theory, and graph spectral theory. Additionally, you will have the chance to engage in collaborative reading of recent technical reports and research papers with your peers, encompassing machine learning algorithms pertaining to large language models, knowledge embedding, and social attribute prediction.

Seminar Programming 3 (Bachelor)
2513200, WS 23/24, 2 SWS, Open in study portal

Content
Registration information and the content of the seminar will be announced on the course page. Only bachelor students are allowed to attend this seminar.

Seminar Linked Data and the Semantic Web (Bachelor)
2513312, WS 23/24, 3 SWS, Language: German/English, Open in study portal
Content
Linked Data is a way of publishing data on the web in a machine-understandable fashion. The aim of this practical seminar is to build applications and devise algorithms that consume, provide, or analyse Linked Data.

The Linked Data principles are a set of practices for data publishing on the web. Linked Data builds on the web architecture and uses HTTP for data access, and RDF for describing data, thus aiming towards web-scale data integration. There is a vast amount of data available published according to those principles: recently, 4.5 billion facts have been counted with information about various domains, including music, movies, geography, natural sciences. Linked Data is also used to make web-pages machine-understandable, corresponding annotations are considered by the big search engine providers. On a smaller scale, devices on the Internet of Things can also be accessed using Linked Data which makes the unified processing of device data and data from the web easy.

In this practical seminar, students will build prototypical applications and devise algorithms that consume, provide, or analyse Linked Data. Those applications and algorithms can also extend existing applications ranging from databases to mobile apps.

For the seminar, programming skills or knowledge about web development tools/technologies are highly recommended. Basic knowledge of RDF and SPARQL are also recommended, but may be acquired during the seminar. Students will work in groups. Seminar meetings will take place as ‘Block-Seminar’.

Topics of interest include, but are not limited to:

- Travel Security
- Geo data
- Linked News
- Social Media

The exact dates and information for registration will be announced at the event page.

**Seminar Real-World Challenges in Data Science and Analytics (Bachelor)**

2513314, WS 23/24, 3 SWS, Language: German/English, [Open in study portal](#)

**Seminar Real-World Challenges in Data Science and Analytics (Master)**

2513315, WS 23/24, 3 SWS, Language: German/English, [Open in study portal](#)
### 8.231 Course: Seminar in Mathematics (Bachelor) [T-MATH-102265]

| Responsible          | Dr. Martin Folkers  
|                      | Prof. Dr. Günter Last  
| Organisation         | KIT Department of Mathematics  
| Part of              | M-WIWI-101816 - Seminar Module  

| Type               | Examination of another type  
| Credits            | 3  
| Grading scale      | Grade to a third  
| Version            | 1  

Industrial Engineering and Management B.Sc.  
Module Handbook as of 04/10/2023
8.232 Course: Seminar in Operations Research (Bachelor) [T-WIWI-103488]

**Responsible:** Prof. Dr. Stefan Nickel  
Prof. Dr. Steffen Rebennack  
Prof. Dr. Oliver Stein

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-101816 - Seminar Module

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**Examination of another type**

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**Exams**

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**Competence Certificate**

Alternative exam assessment (§ 4(2), 3 SPO 2015). The following aspects are included:

- Regular participation in the seminar dates
- Preparation of a seminar paper on a partial aspect of the seminar topic according to scientific methods
- Lecture on the topic of the seminar paper.

The point scheme for the assessment is determined by the lecturer of the respective course. It will be announced at the beginning of the course.

**Prerequisites**

None.

**Recommendation**

See seminar description in the course catalogue of the KIT (https://campus.kit.edu/)
Annotation
The listed seminar titles are placeholders. Currently offered seminars of each semester will be published on the websites of the institutes and in the course catalogue of the KIT. In general, the current seminar topics of each semester are already announced at the end of the previous semester. Furthermore for some seminars there is an application required. The available places are listed on the internet: https://portal.wiwi.kit.edu.

Below you will find excerpts from events related to this course:

Seminar on Methodical Foundations of Operations Research (B)
2550131, SS 2023, 2 SWS, Language: German, Open in study portal
On-Site

Content
The seminar aims at describing, evaluating, and discussing recent as well as classical topics in continuous optimization. The focus is on the treatment of optimization models and algorithms, also with respect to their practical application.

Bachelor students are introduced to the style of scientific work. By focussed treatment of a scientific topic they deal with the basics of scientific investigation and reasoning.

For further development of a scientific work style, master students are particularly expected to critically question the seminar topics.

With regard to the oral presentations the students become acquainted with presentation techniques and basics of scientific reasoning. Also rhetoric abilities may be improved.

Remarks:
Attendance at all oral presentations is compulsory.
Preferably at least one module offered by the Institute of Operations Research should have been chosen before attending this seminar.

Assessment:
The assessment is composed of a 15-20 page paper as well as a 40-60 minute oral presentation according to §4(2), 3 of the examination regulation. The grade is composed of the equally weighted assessments of the paper and the oral presentation.

The seminar is appropriate for bachelor as well as for master students. Their differentiation results from different assessment criteria for the seminar paper and the oral presentation.

Workload:
The total workload for this course is approximately 90 hours. For further information see German version.

Literature
Die Literatur und die relevanten Quellen werden gegen Ende des vorausgehenden Semesters im Wiwi-Portal und in einer Seminarvorbereitung bekannt gegeben.

References and relevant sources are announced at the end of the preceding semester in the Wiwi-Portal and in a preparatory meeting.

Seminar: Modern OR and Innovative Logistics
2550491, SS 2023, 2 SWS, Language: German, Open in study portal
Blended (On-Site/Online)
Content
The seminar aims at the presentation, critical evaluation and exemplary discussion of recent questions in discrete optimization. The focus lies on optimization models and algorithms, also with regard to their applicability in practical cases (especially in Supply Chain and Health Care Management). The students get in touch with scientific working: The in-depth work with a special scientific topic makes the students familiar with scientific literature research and argumentation methods. As a further aspect of scientific work, especially for Master students the emphasis is put on a critical discussion of the seminar topic. Regarding the seminar presentations, the students will be familiarized with basic presentational and rhetoric skills.

The topics of the seminar will be announced at the beginning of the term in a preliminary meeting. Attendance is compulsory for the preliminary meeting as well for all seminar presentations.

Exam:
The assessment consists of a written seminar thesis of 20-25 pages and a presentation of 35-40 minutes (according to §4(2), 3 of the examination regulation).

The final mark for the seminar consists of the seminar thesis, the seminar presentation, the handout, and if applicable further material such as programming code.

The seminar can be attended both by Bachelor and Master students. A differentiation will be achieved by different valuation standards for the seminar thesis and presentation.

Requirements:
If possible, at least one module of the institute should be taken before attending the seminar.

Objectives:
The student
- illustrates and evaluates classic and current research questions in discrete optimization,
- applies optimization models and algorithms in discrete optimization, also with regard to their applicability in practical cases (especially in Supply Chain and Health Care Management),
- successfully gets in touch with scientific working by an in-depth working on a special scientific topic which makes the student familiar with scientific literature research and argumentation methods,
- acquires good rhetorical and presentation skills.

As a further aspect of scientific work, especially for Master students the emphasis is put on a critical discussion of the seminar topic.

Organizational issues
wird auf der Homepage dol.ior.kit.edu bzw. auf dem WiWi-Portal bekannt gegeben

Literature
Die Literatur und die relevanten Quellen werden zu Beginn des Seminars bekannt gegeben.

Seminar on Methodical Foundations of Operations Research (B)
2550131, WS 23/24, 2 SWS, Language: German, Open in study portal
Literature
Die Literatur und die relevanten Quellen werden gegen Ende des vorausgehenden Semesters im Wiwi-Portal und in einer Seminarvorbereitung bekannt gegeben.

References and relevant sources are announced at the end of the preceding semester in the Wiwi-Portal and in a preparatory meeting.

Seminar: Modern OR and Innovative Logistics
2550491, WS 23/24, 2 SWS, Language: German, Open in study portal
Seminar (S) Blended (On-Site/Online)

Content
The seminar aims at the presentation, critical evaluation and exemplary discussion of recent questions in discrete optimization. The focus lies on optimization models and algorithms, also with regard to their applicability in practical cases (especially in Supply Chain and Health Care Management). The students get in touch with scientific working: The in-depth work with a special scientific topic makes the students familiar with scientific literature research and argumentation methods. As a further aspect of scientific work, especially for Master students the emphasis is put on a critical discussion of the seminar topic. Regarding the seminar presentations, the students will be familiarized with basic presentational and rhetoric skills.

Organizational issues
Anmeldezeitraum: 11.09.23 bis 30.09.23 im Wiwi Portal

Literature
Die Literatur und die relevanten Quellen werden zu Beginn des Seminars bekannt gegeben.
8.233 Course: Seminar in Statistics (Bachelor) [T-WIWI-103489]

**Responsible:** Prof. Dr. Oliver Grothe  
Prof. Dr. Melanie Schienle

**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101816 - Seminar Module

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<td>Advanced Topics in Econometrics</td>
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**Exams**

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**Competence Certificate**

Alternative exam assessment (§ 4(2), 3 SPO 2015). The following aspects are included:

- Regular participation in the seminar dates
- Preparation of a seminar paper on a partial aspect of the seminar topic according to scientific methods
- Lecture on the topic of the seminar paper.

The point scheme for the assessment is determined by the lecturer of the respective course. It will be announced at the beginning of the course.

**Prerequisites**

None.

**Recommendation**

See seminar description in the course catalogue of the KIT (https://campus.kit.edu/)

**Annotation**

The listed seminar titles are placeholders. Currently offered seminars of each semester will be published on the websites of the institutes and in the course catalogue of the KIT. In general, the current seminar topics of each semester are already announced at the end of the previous semester. Furthermore for some seminars there is an application required.

The available places are listed on the internet: https://portal.wiwi.kit.edu.

**Below you will find excerpts from events related to this course:**

**Predictive Data Analytics - An Introduction to Statistical Machine Learning**  
2500004, SS 2023, 2 SWS, Language: German/English, Open in study portal

**Organizational issues**

Blockveranstaltung. Termine werden bekannt gegeben
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**Organizational issues**
Blockveranstaltung. Termine werden bekannt gegeben.

**Organizational issues**
Blockveranstaltung. Termine werden auf Homepage und über Ilias bekannt gegeben.
8.234 Course: Seminar Production Technology [T-MACH-109062]

**Responsible:** Prof. Dr.-Ing. Jürgen Fleischer
Prof. Dr.-Ing. Gisela Lanza
Prof. Dr.-Ing. Volker Schulze

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-WIWI-101816 - Seminar Module

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**Events**

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**Legend:** 🖥 Online, 🧩 Blended (On-Site/Online), 🧹 On-Site, ⌂ Cancelled

**Competence Certificate**

Alternative test achievement (graded):

- written elaboration (workload of at least 80 h)
- oral presentation (approx. 30 min)

**Prerequisites**

none

**Annotation**

The specific topics are published on the homepage of the wbk Institute of Production Science.

*Below you will find excerpts from events related to this course:*
Content
In course of the seminar Production Technology current issues of the wbk main fields of research "Manufacturing and Materials Technology", "Machines, Equipment and Process Automation" as well as "Production Systems" are discussed. The specific topics are published on the homepage of the wbk Institute of Production Science.

Learning Outcomes:
The students ...

- are in a position to independently handle current, research-based tasks according to scientific criteria.
- are able to research, analyze, abstract and critically review the information.
- can draw own conclusions using their interdisciplinary knowledge from the less structured information and selectively develop current research results.
- can logically and systematically present the obtained results both orally and in written form in accordance with scientific guidelines (structuring, technical terminology, referencing). They can argue and defend the results professionally in the discussion.

Workload:
regular attendance: 10 hours
self-study: 80 hours

Organizational issues
siehe http://www.wbk.kit.edu/seminare.php
# 8.235 Course: Seminar: Legal Studies I [T-INFO-101997]

**Responsible:** N.N.  
**Organisation:** KIT Department of Informatics  
**Part of:** M-WIWI-101816 - Seminar Module

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*Below you will find excerpts from events related to this course:*

### Internet und Gesellschaft - gesellschaftliche Werte und technische Umsetzung
2400061, SS 2023, 2 SWS, [Open in study portal](https://portal.wiwi.kit.edu/ys/5877)

#### Content
- Registration via [https://portal.wiwi.kit.edu/ys/5877](https://portal.wiwi.kit.edu/ys/5877)

#### Organizational issues
 nach Vereinbarung

### EU Digital Regulatory Framework
2400184, WS 23/24, 2 SWS, Language: English, [Open in study portal](https://portal.wiwi.kit.edu/ys/5877)
Content
This class aims to provide an overview on the legal instruments forming the EU digital regulatory framework. Following its Digital Single Market Strategy, the EU has set up a new strategic programme for a "Digital Decade". Existing regulations like the General Data Protection Regulation (GDPR), or the E-Commerce Directive, are being complemented by a variety of new instruments that aim to set binding rules on online markets, to regulate data flows in various ways, but also to pioneer a legal framework on AI. Prominent instruments include the new AI Act (proposal), the Digital Services Act (DSA) and Digital Markets Act (DMA), the Data Act, Data Governance Act, or Open Data Directive.

The class will provide an overview on the existing framework: Which regulations and directives are relevant? How do they apply and interact which each other in a broader context?

Another objective is to provide students with the ability to read these legal instruments: How to access regulatory instruments that often have more than 100 pages (without having to read every single sentence)? How to gain a comprehensive, high-level understanding of the instrument? How to identify parts relevant to a particular legal problem?

The class will start with an introduction into EU law and regulatory instruments in general. Concrete guidance on reading, analysing and working with legal instruments in English will be given. Based on these instructions, students will be assigned legal instruments to present in the final unit along with a one-page report.

Grades will be assigned based on the quality of these presentations and the report, as well as participation in the discussion (presentation: 60 %, one-page report: 20 %, discussion: 20 %).

Organizational issues
WS 2023/24
### 8.236 Course: Signals and Systems [T-ETIT-112860]

**Responsible:** Dr.-Ing. Mathias Kluwe  
Prof. Dr.-Ing. Sander Wahls  

**Organisation:** KIT Department of Electrical Engineering and Information Technology  

**Part of:** M-ETIT-106372 - Signals and Systems

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**Prerequisites**

none
8.237 Course: Signals and Systems - Workshop [T-ETIT-112861]

**Responsible:** Dr.-Ing. Mathias Kluwe
Prof. Dr.-Ing. Sander Wahls

**Organisation:** KIT Department of Electrical Engineering and Information Technology

**Part of:** M-ETIT-106372 - Signals and Systems

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**Events**

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Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ❌ Cancelled

**Prerequisites**

none
8.238 Course: Simulation of Coupled Systems [T-MACH-105172]

**Responsible:** Prof. Dr.-Ing. Marcus Geimer

**Organisation:** KIT Department of Mechanical Engineering

**Part of:**
- M-MACH-101265 - Vehicle Development
- M-MACH-101267 - Mobile Machines

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**Competence Certificate**
The assessment consists of an oral exam (20 min) taking place in the recess period. The exam takes place in every semester. Re-examinations are offered at very ordinary examination date.

A registration is mandatory, the details will be announced on the webpages of the Institute of Vehicle System Technology / Institute of Mobile Machines. In case of too many applications, attendance will be granted based on pre-qualification.

**Prerequisites**
Required for the participation in the examination is the preparation of a report during the semester. The partial service with the code T-MACH-108888 must have been passed.

**Recommendation**
- Knowledge of ProE (ideally in actual version)
- Basic knowledge of Matlab/Simulink
- Basic knowledge of dynamics of machines
- Basic knowledge of hydraulics

**Annotation**
After completion of course, students are able to:
- build a coupled simulation
- parametrize models
- perform simulations
- conduct troubleshooting
- check results for plausibility

The number of participants is limited.

**Content:**
- Basics of multi-body and hydraulics simulation programs
- Possibilities of coupled simulations
- Modelling and Simulation of Mobile Machines using a wheel loader
- Documentation of the result in a short report

**Literature:**
- Software guide books (PDFs)
- Information about wheel-type loader specifications

*Below you will find excerpts from events related to this course:*
Content

- Knowledge of the basics of multi-body and hydraulic simulation programs
- Possibilities of coupled simulations
- Development of a simulation model by using the example of a wheel loader
- Documentation of the result in a short report

It is recommended to have:

- Knowledge of ProE (ideally in current version)
- Basic knowledge of Matlab/Simulink
- Basic knowledge of dynamics of machines
- Basic knowledge of hydraulics

- regular attendance: 21 hours
- total self-study: 92 hours

Literature

Weiterführende Literatur:

- Diverse Handbücher zu den Softwaretools in PDF-Form
- Informationen zum verwendeten Radlader
### Course: Simulation of Coupled Systems - Advance [T-MACH-108888]

**Responsible:** Prof. Dr.-Ing. Marcus Geimer
Yusheng Xiang

**Organisation:** KIT Department of Mechanical Engineering

**Part of:**
- M-MACH-101265 - Vehicle Development
- M-MACH-101267 - Mobile Machines

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**Exams**

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<td>Simulation of Coupled Systems - Advance</td>
<td>Geimer</td>
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**Competence Certificate**
Preparation of semester report

**Prerequisites**
None
8.240 Course: Social Science A (WiWi) [T-GEISTSOZ-109048]

**Responsible:** Prof. Dr. Gerd Nollmann

**Organisation:** KIT Department of Humanities and Social Sciences

**Part of:** M-GEISTSOZ-101167 - Sociology/Empirical Social Research

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<td>Block</td>
<td>Repke</td>
<td>Seminar / Online</td>
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<td>Seminar</td>
<td>Mäs</td>
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</table>

**Below you will find excerpts from events related to this course:**

**Digital democracy: worries, opportunities, and challenges**

**5011013, SS 2023, 2 SWS, Language: German, Open in study portal**

**Content**

Democracy is under pressure. Populists celebrated election victories in various countries. Studies report dropping trust in institutions. Events such as Brexit, the Capitol-Riots, and the occupation of the entrance to the Bundestag lower confidence in the ability of democratic societies to master the great challenges they face.

It has been argued that not less but more democracy may be the solution. In particular, there is hope that digital methods will allow citizens to participate more in democratic debate and decision making. In contrast, experts warn that existing digital tools such as online social networks demonstrate that a digital approach also has important disadvantages.

This seminar, we will ask whether digital tools can enhance democratic debate and decision making. We will develop quality criteria and apply them to existing digital approaches such as the Conference on the Future of Europe.

**How to control algorithms?**

**5011019, SS 2023, 2 SWS, Language: German, Open in study portal**

**Content**

It has been warned that algorithms might have undesired effects on societies, fostering, for instance, the polarization of political opinions, the spreading of fake news, and the influence of foreign powers on democratic elections.

In this seminar, we will analyze these warning and research testing them. In addition, we will focus on the question how undesired effects of algorithms can be prevented. How should users react? Should governments intervene? Are companies like Facebook and Google responsible?

**Organizational issues**

Teilnehmende halten einen Kurzvortrag und erstellen einen Seminararbeit.
### Course: Social Science B (WiWi) [T-GEISTSOZ-109049]

** Responsible:** Prof. Dr. Gerd Nollmann  
** Organisation:** KIT Department of Humanities and Social Sciences  
** Part of:** M-GEISTSOZ-101167 - Sociology/Empirical Social Research

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#### Events

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#### Exams

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**Legend:** 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ❌ Cancelled
8.242 Course: Special Topics in Information Systems [T-WIWI-109940]

**Responsible:** Prof. Dr. Christof Weinhardt

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-101434 - eBusiness and Service Management

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<td>ST 2023 00032</td>
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<td>ST 2023 7900326</td>
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<td>Special Topics in Information Systems</td>
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**Competence Certificate**
The assessment of this course is in form of a written documentation, a presentation of the outcome of the conducted practical components and an active participation in class.

Please take into account that, beside the written documentation, also a practical component (such as a survey or an implementation of an application) is part of the course. Please examine the course description for the particular tasks.

The overall grade is composed as follows:

A total of 60 points can be achieved, of which

- A maximum of 30 points for the written documentation
- A maximum of 30 points for the practical component

In order to pass the success control, at least 15 points (written documentation / practical component) must be achieved.

**Prerequisites**
see below

**Recommendation**
None

**Annotation**
All the practical seminars offered at the chair of Prof. Dr. Weinhardt can be chosen in the Special Topics in Information Systems course. The current topics of the practical seminars are available at the following homepage: www.iism.kit.edu/im/lehre.

The Special Topics Information Systems is equivalent to the practical seminar, as it was only offered for the major in “Information Systems” so far. With this course students majoring in “Industrial Engineering and Management” and “Economics Engineering” also have the chance of getting practical experience and enhance their scientific capabilities.

The Special Topics Information Systems can be chosen instead of a regular lecture (see module description). Please take into account, that this course can only be accounted once per module.
### 8.243 Course: Statistical Modeling of Generalized Regression Models [T-WIWI-103065]

**Responsible:** apl. Prof. Dr. Wolf-Dieter Heller

**Organisation:** KIT Department of Economics and Management

**Part of:**
- M-WIWI-101599 - Statistics and Econometrics
- M-WIWI-105414 - Statistics and Econometrics II

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**Type**
- Written examination

**Credits**
- 4.5

**Grading scale**
- Grade to a third

**Recurrence**
- Each winter term

**Version**
- 1

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<td>2 SWS</td>
<td>Lecture</td>
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| Exams | | | |
| ST 2023 | | 7900146 (SS23) | Statistical Modeling of generalized regression models | Heller |
| WT 23/24 | | 7900146 (WS23/24) | Statistical Modeling of generalized regression models | Heller |

**Competence Certificate**
The assessment of this course is a written examination (60 min) according to §4(2), 1 of the examination regulation.

**Prerequisites**
None

**Recommendation**
Knowledge of the contents covered by the course "Economics III: Introduction in Econometrics" [2520016]

Below you will find excerpts from events related to this course:

### V Statistical Modeling of Generalized Regression Models

**2521350, WS 23/24, 2 SWS, Open in study portal**

**Lecture (V)**

**Content**

**Learning objectives:**
The student has profound knowledge of generalized regression models.

**Requirements:**
Knowledge of the contents covered by the course "Economics III: Introduction in Econometrics" [2520016].

**Workload:**
- Total workload for 4.5 CP: approx. 135 hours
- Attendance: 30 hours
- Preparation and follow-up: 65 hours
### Course: Statistics I [T-WIWI-102737]

**Responsible:** Prof. Dr. Oliver Grothe  
Prof. Dr. Melanie Schienle  

**Organisation:** KIT Department of Economics and Management

**Part of:**  
M-WIWI-100950 - Preliminary Exam  
M-WIWI-101432 - Introduction to Statistics

### Type

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### Exams

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<td>WT 23/24</td>
<td>7900022</td>
<td>Krüger, Lerch</td>
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### Competence Certificate

Depending on further pandemic developments, the examination will be offered either as a 120-minute written examination (written examination according to SPO § 4 Abs. 2, Pkt. 1) or as an open-book examination (alternative exam assessment according to SPO § 4 Abs. 2, Pkt. 3).

### Prerequisites

None

Below you will find excerpts from events related to this course:

#### Statistics I

2600008, SS 2023, 4 SWS, Language: German, [Open in study portal](#)

#### Content

**Learning objectives:**

Students understand and apply

- basic concepts of statistical data exploration as well as
- basic definitions and theorems of probability theory.

**Content:**

A. Descriptive Statistics: univariate und bivariate analysis  
B. Probability Theory: probability space, conditional and product probabilities  
C. Random variables: location and shape parameters, dependency measures, concrete distribution models

**Workload:**

Total workload for 5 CP: approx. 150 hours  
Attendance: 60 hours  
Preparation and follow-up: 90 hours
Literature
Skriptum: Kurzfassung Statistik I
Weiterführende Literatur:
8.245 Course: Statistics II [T-WIWI-102738]

**Responsible:** Prof. Dr. Oliver Grothe
                        Prof. Dr. Melanie Schienle

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-101432 - Introduction to Statistics

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**Exams**

| WT 23/24 | 7900001 | Statistics II |          |            | Krüger, Lerch |

**Competence Certificate**

The assessment consists of a written exam according to Section 4 (2), 1 of the examination regulation. The exam takes place at the end of the lecture period or at the beginning of the recess period. The re-examination takes place in the following semester.

**Prerequisites**

None

**Recommendation**

It is recommended to attend the course Statistics I [2600008] before the course Statistics II [2610020].

*Below you will find excerpts from events related to this course:*

**Statistics II**

2610020, WS 23/24, 4 SWS, Language: German, [Open in study portal](#)

**Content**

**Learning objectives:**

The student

- understands and applies the basic definitions and theorems of probability theory,
- transfers these theoretical foundations to problems in parametrical mathematical statistics.

**Requirements:**

It is recommended to attend the course Statistics I [2600008] before the course Statistics II [2600020].

**Workload:**

- Total workload: 150 hours (5.0 Credits).
- Attendance: 30 hours
- Preparation and follow-up: 90 hours
Literatur
Skriptum: Kurzfassung Statistik II

Weiterführende Literatur:
8.246 Course: Strategic Finance and Technology Change [T-WIWI-110511]

**Responsible:** Prof. Dr. Martin Ruckes

**Organisation:** KIT Department of Economics and Management

**Part of:**
- M-WIWI-101423 - Topics in Finance II
- M-WIWI-101465 - Topics in Finance I

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**Exams**

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**Competence Certificate**

The assessment consists of a written exam (60 min.) according to § 4 paragraph 2 Nr. 1 of the examination regulation. The exam is offered each semester. If there are only a small number of participants registered for the exam, we reserve the right to hold an oral examination instead of a written one.

**Prerequisites**

None

**Recommendation**

Attending the lecture “Financial Management” is strongly recommended.
8.247 Course: Strategic Management [T-WIWI-113090]

**Responsible:** Prof. Dr. Hagen Lindstädt  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101425 - Strategy and Organization

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**Legends:** 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ❗ Cancelled

**Competence Certificate**
The assessment consists of a written exam (60 min) taking place at the beginning of the recess period (according to §4 (2), 1 of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

**Prerequisites**
None

Below you will find excerpts from events related to this course:

**Management and Strategy**
2577900, SS 2023, 2 SWS, Language: German, [Open in study portal]

Lecture (V)  
On-Site
Content
Students learn central concepts of strategic management along the ideal-typical strategy process. An overview of fundamental frameworks and models will be provided and an action-oriented integration performance will be achieved through the transfer of theory to practical issues.

Through intensive exposure to real-world case studies, students will be encouraged to learn and apply strategic measures in a targeted manner in the real business world. The course features an action-oriented approach and provides students with a realistic understanding of the possibilities and limitations of rational design approaches.

Content in Keywords:
- Corporate governance and strategic management: concepts, levels, process.
- Strategic analysis: internal and external analysis
- Competitive strategy: formulation, evaluation and selection of strategic action alternatives at business unit level
- Strategic interaction and strategic commitment
- Corporate strategy: diversification strategy, M&A and management of the corporate portfolio
- Implementation of strategies in companies

Structure:
Lectures in the course are available to students online as recordings, while class dates are reserved for active discussion of real-world case studies.

Learning Objectives:
Upon completion of the course, students will be able to,
- Prepare strategic decisions along the ideal strategic process in a practical setting,
- Identify sources of competitive advantage,
- Explain interrelationships of companies in competition,
- Evaluate the portfolio management of companies,
- To classify actions and decisions of companies strategically,
- Apply knowledge from theoretical frameworks to the analysis of real-life situations.

Recommendations:
None.

Workload:
Total workload for 3.5 credit hours: approximately 105 hours.
Attendance: 30 hours
Self-study: 75 hours

Verification:
Depending on further pandemic developments, the examination will be offered in the summer semester 2021 either as an open-book examination (examination performance of another kind according to SPO § 4 Abs. 2, Pkt. 3), or as a 60-minute written examination (written examination according to SPO § 4 Abs. 2, Pkt. 1).

It is expected that the exam will take place at the beginning of the semester's lecture-free period.
The examination is offered every semester and can be repeated at any regular examination date.

Literature

Die relevanten Auszüge und zusätzliche Quellen werden in der Veranstaltung bekannt gegeben.
## 8.248 Course: Structural and Phase Analysis [T-MACH-102170]

**Responsible:** Dr. Manuel Hinterstein  
Dr.-Ing. Susanne Wagner  

**Organisation:** KIT Department of Mechanical Engineering  

**Part of:** M-MACH-101262 - Emphasis Materials Science

<table>
<thead>
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<td>Each winter term</td>
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| Exams       | Credits | Course Title               | Lecturer          | |
|-------------|---------|----------------------------|-------------------|
| ST 2023     | 76-T-MACH-102170 | Structural and Phase Analysis | Wagner, Hinterstein |
| WT 23/24    | 76-T-MACH-102170 | Structural and Phase Analysis | Wagner, Hinterstein |

**Competence Certificate**  
Oral examination

**Prerequisites**  
none
8.249 Course: Structural Ceramics [T-MACH-102179]

**Responsible:** Prof. Dr. Michael Hoffmann

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101262 - Emphasis Materials Science

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**Competence Certificate**

Oral examination, 20 min

**Prerequisites**

none
8.250 Course: Supplement Applied Informatics [T-WIWI-110711]

**Responsible:** Professorenschaft des Instituts AIFB

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-101426 - Electives in Informatics

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**Competence Certificate**
The assessment of this course is a written or (if necessary) oral examination.
Depending on the particular course associated with this placeholder a bonus on the examination grade is possible.

**Prerequisites**
None

**Annotation**
This course can be used in particular for the acceptance of external courses whose content is in the broader area of applied informatics, but is not equivalent to another course of this topic.
Course: Sustainable Vehicle Drivetrains [T-MACH-111578]

**Responsible:** Prof. Dr. Thomas Koch  
Dr.-Ing. Olaf Toedter

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101303 - Combustion Engines II

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<th>2133132</th>
<th>Sustainable Vehicle Drivetrains</th>
<th>2 SWS</th>
<th>Lecture / 🗣 Toedter</th>
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Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✗ Cancelled

**Competence Certificate**
oral exam (approx. 20 minutes)

**Prerequisites**
none

**Annotation**
Starting in winter term 25/26, the course consists of a lecture (2h / week) and a tutorial (1 h / week).

Below you will find excerpts from events related to this course:

**Sustainable Vehicle Drivetrains**  
2133132, WS 23/24, 2 SWS, Language: German, Open in study portal

**Content**
Sustainability  
Environmental balance  
Legislation  
Alternative fuels  
BEV  
Fuel cell  
Hybrid drives
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**Prerequisites**

none
## Course: Systematic Materials Selection [T-MACH-100531]

**Responsible:** Dr.-Ing. Stefan Dietrich  
Prof. Dr.-Ing. Volker Schulze  

**Organisation:** KIT Department of Mechanical Engineering  

**Part of:** M-MACH-101262 - Emphasis Materials Science

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### Events

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<td>Systematic Materials Selection</td>
<td>3 SWS</td>
<td>Lecture / 🗣</td>
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<td>2174577</td>
<td>Exercises in Systematic Materials Selection</td>
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### Exams

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<td>76-T-MACH-100531</td>
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**Legend:**  
🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ☒ Cancelled

### Competence Certificate
The assessment is carried out as a written exam of 2 h.

### Prerequisites
none

### Recommendation
Basic knowledge in materials science, mechanics and mechanical design due to the lecture Materials Science I/II.

**Below you will find excerpts from events related to this course:**

### Systematic Materials Selection

**2174576, SS 2023, 3 SWS, Language: German, Open in study portal**

**Lecture (V) On-Site**
**Content**

Important aspects and criteria of materials selection are examined and guidelines for a systematic approach to materials selection are developed. The following topics are covered:

- Information and introduction
- Necessary basics of materials
- Selected methods / approaches of the material selection
- Examples for material indices and materials property charts
- Trade-off and shape factors
- Sandwich materials and composite materials
- High temperature alloys
- Regard of process influences
- Material selection for production lines
- Incorrect material selection and the resulting consequences
- Abstract and possibility to ask questions

**Learning objectives:**

The students are able to select the best material for a given application. They are proficient in selecting materials on base of performance indices and materials selection charts. They can identify conflicting objectives and find sound compromises. They are aware of the potential and the limits of hybrid material concepts (composites, bimaterials, foams) and can determine whether following such a concept yields a useful benefit.

**Requirements:**

Wiling SPO 2007 (B.Sc.)

The course Material Science I [21760] has to be completed beforehand.

Wiling (M.Sc.)

The course Material Science I [21760] has to be completed beforehand.

**Workload:**

The workload for the lecture is 120 h per semester and consists of the presence during the lecture (30 h) as well as preparation and rework time at home (30 h) and preparation time for the oral exam (60 h).

**Literature**

Vorlesungsskriptum; Übungsblätter; Lehrbuch: M.F. Ashby, A. Wanner (Hrsg.), C. Fleck (Hrsg.);

Materials Selection in Mechanical Design: Das Original mit Übersetzungshilfen

Easy-Reading-Ausgabe. 3. Aufl., Spektrum Akademischer Verlag. 2006

ISBN: 3-8274-1762-7

Lecture notes; Problem sheets; Textbook: M.F. Ashby, A. Wanner (Hrsg.), C. Fleck (Hrsg.);

Materials Selection in Mechanical Design: Das Original mit Übersetzungshilfen

Easy-Reading-Ausgabe. 3. Aufl., Spektrum Akademischer Verlag. 2006

ISBN: 3-8274-1762-7
# 8.254 Course: Systems of Remote Sensing, Prerequisite [T-BGU-101637]

**Responsible:** Prof. Dr. Jan Cermak  
Prof. Dr.-Ing. Stefan Hinz  
Dr.-Ing. Uwe Weidner

**Organisation:** KIT Department of Civil Engineering, Geo and Environmental Sciences

**Part of:** M-WIWI-104838 - Introduction to Natural Hazards and Risk Analysis

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<td>Systems of Remote Sensing, Excercise</td>
<td>1 SWS</td>
<td>Practice / 🗣</td>
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**Exams**

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<td>Andersen, Cermak</td>
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**Prerequisites**

None

**Recommendation**

None

**Annotation**

None
8.255 Course: Tactical and Operational Supply Chain Management [T-WIWI-102714]

**Responsible:** Prof. Dr. Stefan Nickel

**Organisation:** KIT Department of Economics and Management

**Part of:**
- M-WIWI-101413 - Applications of Operations Research
- M-WIWI-101421 - Supply Chain Management
- M-WIWI-103278 - Optimization under Uncertainty

**Type**
- Written examination

**Credits**
- 4.5

**Grading scale**
- Grade to a third

**Recurrence**
- Each summer term

**Version**
- 3

**Events**

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<td>3 SWS</td>
<td>Tactical and operational SCM</td>
<td>Lecture / 📚</td>
<td>Nickel</td>
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<td>1.5 SWS</td>
<td>Übungen zu Taktisches und operatives SCM</td>
<td>Practice / 📚</td>
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**Exams**

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**Legend:** 📚 Online, 📚 Blended (On-Site/Online), 📚 On-Site, ⚠ CANCELLED

**Competence Certificate**
Depending on further pandemic developments, the exam will be offered either as an open-book exam, or as a written exam (60 min).

The exam takes place in every semester.
Prerequisite for admission to examination is the successful completion of the online assessments.

**Prerequisites**
Prerequisite for admission to examination is the successful completion of the online assessments.

**Recommendation**
None

**Annotation**
The lecture is held in every summer term. The planned lectures and courses for the next three years are announced online.

Below you will find excerpts from events related to this course:

**Tactical and operational SCM**
2550486, SS 2023, 3 SWS, Language: German, Open in study portal

**Content**
The planning of material transport is an essential element of Supply Chain Management. By linking transport connections across different facilities, the material source (production plant) is connected with the material sink (customer). The general supply task can be formulated as follows (cf. Gudehus): For given material flows or shipments, choose the optimal (in terms of minimal costs) distribution and transportation chain from the set of possible logistics chains, which asserts the compliance of delivery times and further constraints. The main goal of the inventory management is the optimal determination of order quantities in terms of minimization of fixed and variable costs subject to resource constraints, supply availability and service level requirements. Similarly, the problem of lot sizing in production considers the determination of the optimal amount of products to be produced in a time slot. The course includes an introduction to basic terms and definitions of Supply Chain Management and a presentation of fundamental quantitative planning models for distribution, vehicle routing, inventory management and lot sizing. Furthermore, case studies from practice will be discussed in detail.

Passing the online exercise is a prerequisite for admission to the exam.
Literature
Weiterführende Literatur

- Domschke: Logistik: Transporte, 5. Auflage, Oldenbourg, 2005
- Ghiani, Laporte, Musmanno: Introduction to Logistics Systems Planning and Control, Wiley, 2004
- Gudehus: Logistik, 3. Auflage, Springer, 2005
8.256 Course: Team Project Management and Technology [T-WWI-110968]

**Responsible:** Prof. Dr. Martin Klarmann  
Prof. Dr. Alexander Mädche

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WWI-105440 - Team Project Management and Technology

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<td>Project / 🖥️</td>
<td>Sunyaev, Dehling, Goram</td>
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<td>Teamprojekt Wirtschaft und Technologie</td>
<td>Project / 🖥️</td>
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**Legend:** 🖥️ Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✗ CANCELLED

**Competence Certificate**

Alternative exam assessment. The basis for grading is the documents produced, the presentations during the course of the project, the artifact to be produced (e.g. algorithm, method, model, software, component) and the final presentation.
8.257 Course: Team Project Management and Technology (BUS/ENG) [T-WIWI-110977]

Responsible: Prof. Dr. Martin Klarmann
Prof. Dr. Alexander Mädche

Organisation: KIT Department of Economics and Management
Part of: M-WIWI-105447 - Team Project Management and Technology (BUS/ENG)

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Events

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Exams

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Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate
Alternative exam assessment. The basis for grading is the documents produced, the presentations during the course of the project, the artifact to be produced (e.g. algorithm, method, model, software, component) and the final presentation.
8.258 Course: Tires and Wheel Development for Passenger Cars [T-MACH-102207]

Responsible: Hon.-Prof. Dr. Günter Leister
Organisation: KIT Department of Mechanical Engineering
Part of: M-MACH-101265 - Vehicle Development

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Events

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Exams

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Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate
Oral Examination

Duration: 30 up to 40 minutes

Auxiliary means: none

Prerequisites
none

Below you will find excerpts from events related to this course:

V Tires and Wheel Development for Passenger Cars
2114845, SS 2023, 2 SWS, Language: German, Open in study portal
Lecture (V) On-Site

Content

1. The role of the tires and wheels in a vehicle
2. Geometry of Wheel and tire, Package, load capacity and endurance, Book of requirement
3. Mobility strategy, Minispare, runflat systems and repair kit.
4. Project management: Costs, weight, planning, documentation
5. Tire testing and tire properties
6. Wheel technology including Design and manufacturing methods, Wheeltesting
7. Tire pressure: Indirect and direct measuring systems
8. Tire testing subjective and objective

Learning Objectives:
The students are informed about the interactions of tires, wheels, and chassis. They have an overview of the processes regarding the tire and wheel development. They have knowledge of the physical relationships.

Organizational issues
Voraussichtliche Termine, nähere Informationen und eventuelle Terminänderungen:
siehe Institutshomepage.

Literature
Manuskript zur Vorlesung
Manuskript to the lecture
8.259 Course: Topics in Human Resource Management [T-WIWI-111858]

**Responsible:** Prof. Dr. Petra Nieken  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101513 - Human Resources and Organizations  
M-WIWI-105928 - HR Management & Digital Workplace

<table>
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<td>3</td>
<td>Grade to a third</td>
<td>Each term</td>
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**Competence Certificate**  
Alternative exam assessment.  
The grade is composed of the presentation of a given research topic and active participation in the course discussions. The final grade will be composed of the graded and weighted performance reviews (the weighting depends on the course).

**Prerequisites**  
This course cannot be combined with T-WIWI-102871 "Problem Solving, Communication and Leadership".

**Recommendation**  
We recommend visiting the course "Human Resource Management" before taking this course.  
The course is strongly recommended for students interested in empirical research in the areas HRM, personnel economics, and leadership.

Below you will find excerpts from events related to this course:

**Topics in Human Resource Management**  
2573015, SS 2023, 2 SWS, Language: German, Open in study portal  
Colloquium (KOL)  
On-Site  
Nieken, Mitarbeiter

**Content**  
The students will discuss and analyze selected research papers in the areas HRM, personnel economics, and leadership. The students will present research papers and discuss research methods and designs as well as content.

**Aim**  
The student

- Looks into current research topics in the areas HRM, personnel economics, and leadership.  
- Analyzes research papers in detail and evaluates the research outcomes.  
- Trains their presentation skills.  
- Learns to critically evaluate research methods and trains the scientific discussion culture.  
- Gains deeper knowledge in the area of HRM.  
- Learns to evaluate research designs and takes into account the ethical dimension of research.

**Notes**  
Due to the interactive nature of the course, the number of participants is limited. If you are interested, please contact Prof. Nieken by email.

**Workload**  
The total workload for this course is approximately 90 hours.  
Lecture: 30 hours  
Preparation: 45 hours  
Exam preparation: 15 hours

**Literature**  
Selected research papers
Organizational issues
Geb. 05.20, Raum 2A-12.1
## 8.260 Course: Tutorial Global Production [T-MACH-110981]

**Responsible:** Prof. Dr.-Ing. Gisela Lanza  
**Organisation:** KIT Department of Mechanical Engineering  
**Part of:** M-MACH-106590 - Production Engineering

<table>
<thead>
<tr>
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<td>2149611</td>
<td>Tutorial Global Production</td>
<td>1 SWS</td>
<td>Practice / 🧩</td>
<td>Lanza</td>
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</table>

**Legend:** 🖥 Online, 🧩 Blended (On-Site/Online), 🔊 On-Site, ✗ Cancelled

**Competence Certificate**  
Alternative achievement (ungraded). Successful completion of the case studies required. Further information will be announced in the course Global Production.

Below you will find excerpts from events related to this course:

### Tutorial Global Production

2149611, WS 23/24, 1 SWS, Language: German, [Open in study portal]  
Practice (Ü)  
Blended (On-Site/Online)
Content
The exercise serves as a supplement to the lecture Global Production and deals with the practical implementation of the management of global production networks of manufacturing companies. The contents conveyed in the lecture are put into practice in the exercise and supplemented by lectures from industry and research. The exercise initially builds on a basic understanding of the influencing factors and challenges of global production. Common methods and procedures for planning, designing and managing global production networks are applied in online case studies based on the restructuring of a fictitious company.

According to the lecture, the exercise is divided into three aspects: production strategy, network configuration and network management.

First of all, the exercise shows the connections between the company strategy and the production strategy and highlights the tasks necessary to define a production strategy. Subsequently, in the context of the design of global production networks, methods for site selection, site-specific adaptation of product design and production technology as well as for the establishment of a new production site and the adaptation of existing production networks to changing conditions are taught. With regard to the management of global production networks, the exercise primarily addresses the topic of procurement and supplier management in greater depth.

The topics in detail are:

- Production strategies for global production Networks
- From corporate strategy to production strategy
- Tasks of the production strategy (product portfolio management, recycling management, vertical integration planning, production-related research and development)
- Design of global production Networks
- Ideal-typical network structures
- Planning process for designing the network structure
- Adaptation of the network structure
- Choice of Location
- Production adjustment to suit the Location
- Management of global production Networks
- Coordination in global production Networks
- Procurement process

Learning Outcomes

The students ...

- are able to apply defined procedures for site selection and evaluate a site decision with the help of different Methods.
- are capable of selecting adequate design options for site-specific production and product design on a case-specific basis.
- can explain the central elements of the planning process when setting up a new production site.
- are capable of applying the methods for the design and layout of global production networks to individual Company problems.
- are able to show the challenges and potentials of the corporate divisions sales, procurement and research and development on a global level.

Workload:

e-Learning: ~ 20 h
regular attendance: ~ 10 h
self-study: covered in the course of the lecture.

Organizational issues
Start in der dritten Vorlesungswoche.
Termine werden vom Institut bekannt gegeben.
8.261 Course: Vehicle Comfort and Acoustics I [T-MACH-105154]

**Responsible:** Prof. Dr. Frank Gauterin

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101264 - Handling Characteristics of Motor Vehicles

<table>
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<td>Each winter term</td>
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<td>Each winter term</td>
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<td>Lecture / 🗣</td>
<td>Grade to a third</td>
<td>Each winter term</td>
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**Competence Certificate**

Oral Examination

Duration: approx. 30 to 40 minutes

**Auxiliary means:** none

**Prerequisites**

Can not be combined with lecture T-MACH-102206

Below you will find excerpts from events related to this course:

**Vehicle Ride Comfort & Acoustics I**

2114856, SS 2023, 2 SWS, Language: English, [Open in study portal](#)

**Lecture (V)**

On-Site

---

**Content**

1. Perception of noise and vibrations

3. Fundamentals of acoustics and vibrations

3. Tools and methods for measurement, computing, simulation and analysis of noise and vibrations

4. The relevance of tire and chassis for the acoustic and mechanical driving comfort: phenomena, influencing parameters, types of construction, optimization of components and systems, conflict of goals, methods of development

An excursion will give insights in the development practice of a car manufacturer or a system supplier.

**Learning Objectives:**

The students know what noises and vibrations mean, how they are generated, and how they are perceived by human beings. They have knowledge about the requirements given by users and the public. They know which components of the vehicle are participating in which way on noise and vibration phenomenon and how they could be improved. They are ready to apply different tools and methods to analyze relations and to judge them. They are able to develop the chassis regarding driving comfort and acoustic under consideration of goal conflicts.
Organizational issues
Kann nicht mit der Veranstaltung [2113806] kombiniert werden.
Can not be combined with lecture [2113806]
Genau Termine entnehmen Sie bitte der Institutshomepage.
Scheduled dates:
see homepage of the institute.
Classroom attendance depends on the development of the pandemic situation.

Literature
2. Russel C. Hibbeler, Technische Mechanik 3, Dynamik, Pearson Studium, München, 2006

Das Skript wird zu jeder Vorlesung zur Verfügung gestellt

Vehicle Comfort and Acoustics I
2113806, WS 23/24, 2 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Content
1. Perception of noise and vibrations
2. Fundamentals of acoustics and vibrations
3. Tools and methods for measurement, computing, simulation and analysis of noise and vibrations
4. The relevance of tire and chasis for the acoustic and mechanical driving comfort: phenomena, influencing parameters, types of construction, optimization of components and systems, conflict of goals, methods of development

An excursion will give insights in the development practice of a car manufacturer or a system supplier.

Learning Objectives:
The students know what noises and vibrations mean, how they are generated, and how they are perceived by human beings. They have knowledge about the requirements given by users and the public. They know which components of the vehicle are participating in which way on noise and vibration phenomenon and how they could be improved. They are ready to apply different tools and methods to analyze relations and to judge them. They are able to develop the chasis regarding driving comfort and acoustic under consideration of goal conflicts.

Organizational issues
Das Vorlesungsmaterial wird auf ILIAS bereitgestellt. Das ILIAS-Passwort erhalten Sie unter https://fast-web-01.fast.kit.edu/Passwoerterilias/
Kann nicht mit der Veranstaltung [2114856] kombiniert werden.
Can not be combined with lecture [2114856]

Literature
2. Russel C. Hibbeler, Technische Mechanik 3, Dynamik, Pearson Studium, München, 2006

Das Skript wird zu jeder Vorlesung zur Verfügung gestellt
8.262 Course: Vehicle Comfort and Acoustics II [T-MACH-105155]

**Responsible:** Prof. Dr. Frank Gauterin

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101264 - Handling Characteristics of Motor Vehicles

<table>
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**Events**

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<td>Vehicle Comfort and Acoustics II</td>
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<td>Vehicle Ride Comfort &amp; Acoustics II</td>
<td>2</td>
<td>Lecture</td>
<td>Gauterin</td>
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**Exams**

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<td>Vehicle Comfort and Acoustics II</td>
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<td>Vehicle Comfort and Acoustics II</td>
<td>Gauterin</td>
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</tbody>
</table>

**Competence Certificate**

**Oral Examination**

Duration: approx. 30 to 40 minutes

Auxiliary means: none

**Prerequisites**

Can not be combined with lecture T-MACH-102205

Below you will find excerpts from events related to this course:

**Vehicle Comfort and Acoustics II**

2114825, SS 2023, 2 SWS, Language: German, Open in study portal

Lecture (V) On-Site
Content
1. Summary of the fundamentals of acoustics and vibrations

2. The relevance of road surface, wheel imperfections, springs, dampers, brakes, bearings and bushings, suspensions, engines and drive train for the acoustic and mechanical driving comfort:
   - phenomena
   - influencing parameters
   - types of construction
   - optimization of components and systems
   - conflicts of goals
   - methods of development

3. Noise emission of motor vehicles
   - noise stress
   - sound sources and influencing parameters
   - legal restraints
   - optimization of components and systems
   - conflict of goals
   - methods of development

Learning Objectives:
The students have knowledge about the noise and vibration properties of the chassis components and the drive train. They know what kind of noise and vibration phenomena do exist, what are the generation mechanisms behind, which components of the vehicle participate in which way and how could they be improved. They have knowledge in the subject area of noise emission of automobiles: Noise impact, legal requirements, sources and influencing parameters, component and system optimization, target conflicts and development methods. They are ready to analyze, to judge and to optimize the vehicle with its single components regarding acoustic and vibration phenomena. They are also able to contribute competently to the development of a vehicle regarding the noise emission.

Organizational issues
Kann nicht mit der Veranstaltung [2114857] kombiniert werden.
Can not be combined with lecture [2114857]
Je nach Pandemie Lage wird evtl. kurzfristig auf "Online Veranstaltung" geändert.

Literature
Das Skript wird zu jeder Vorlesung zur Verfügung gestellt.
Organizational issues
Genaue Termine entnehmen Sie bitte der Institushomepage.
Kann nicht mit der Veranstaltung [2114825] kombiniert werden.
Scheduled dates:
see homepage of the institute.
Can not be combined with lecture [2114825].
Classroom attendance depends on the development of the pandemic situation

Literature
Das Skript wird zu jeder Vorlesung zur Verfügung gestellt.
The script will be supplied in the lectures.
8.263 Course: Virtual Reality Practical Course [T-MACH-102149]

**Responsible:** Prof. Dr.-Ing. Jivka Ovtcharova  
**Organisation:** KIT Department of Mechanical Engineering  
**Part of:** M-MACH-101270 - Product Lifecycle Management

<table>
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**Events**

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<td>Project</td>
<td>Ovtcharova, Häfner</td>
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**Exams**

Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🔔 On-Site, ✗ Cancelled

**Competence Certificate**

Assessment of another type (graded)

**Prerequisites**

None

**Annotation**

Number of participants is limited

Below you will find excerpts from events related to this course:

**Virtual Reality Practical Course**

2123375, WS 23/24, 3 SWS, Language: German/English, [Open in study portal](#)

**Content**

- Introduction in Virtual Reality (hardware, software, applications)
- Exercises in the task specific software systems
- Autonomous project work in the area of Virtual Reality in small groups

**Organizational issues**

Siehe Homepage zur Lehrveranstaltung

**Literature**

Keine / None
Course: Welfare Economics [T-WIWI-102610]

8.264 Course: Welfare Economics [T-WIWI-102610]

Responsible: Prof. Dr. Clemens Puppe
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101501 - Economic Theory

Type: Written examination
Credits: 4,5
Grading scale: Grade to a third
Recurrence: see Annotations
Version: 3

Events
- ST 2023 2520517 Welfare Economics 2 SWS Lecture / Puppe
- ST 2023 2520518 Übung zur Wohlfahrtstheorie 1 SWS Practice / Puppe, Ammann

Exams
- ST 2023 7900162 Welfare Economics Puppe
- ST 2023 7900272 Welfare Economics Puppe
- WT 23/24 7900129 Welfare Economics Puppe

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate
Depending on further pandemic developments, the examination will be offered either as a 60-minute written examination (written examination according to SPO § 4 Abs. 2, Pkt. 1) or as an open-book examination (alternative exam assessment according to SPO § 4 Abs. 2, Pkt. 3).

Prerequisites
The course Economics I: Microeconomics [2610012] has to be completed beforehand.

Recommendation
None

Annotation
The course only takes place every second summer semester, the next course is planned for summer semester 2021.

Below you will find excerpts from events related to this course:

Welfare Economics
2520517, SS 2023, 2 SWS, Language: German, Open in study portal

Content
The lecture "Welfare economics" deals with the question of efficiency and distributional properties of economic allocations, in particular allocations of market equilibria. The lecture is based on the two welfare theorems: The first welfare theorem (under weak preconditions) says that every competitive equilibrium is efficient.

According to the second welfare theorem (under stronger preconditions), every efficient allocation can be preserved as a competitive equilibrium through adequate choices of initial endowments. Afterwards, the terms and definitions of envy-freeness and the related concept of egalitarian equivalence in the context of the general theory of equilibrium will be discussed.

The second part of the lecture deals with the principle of "social justice" (i.e. distributational justice). The fundamental principles of utilitarianism, Rawl’s theory of justice as well as John Roemer’s theory of equality of opportunity are explained and critically analyzed.

The assessment consists of a written exam at the end of the semester (according to Section 4 (2), 1 or 2 of the examination regulation).

The course will be held every two years in the summer.
The total workload for this course is approximately 135 hours. For further information see German version.

Elective literature:
Literature
Weiterführende Literatur:

Course: Workshop Mechatronical Systems and Products (mach/etit/wiwi) [T-MACH-112648]

**Responsible:** Prof. Dr.-Ing. Sören Hohmann
Prof. Dr.-Ing. Sven Matthiesen

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-106236 - Mechatronic Product Design

<table>
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**Events**

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<td>2145162</td>
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<td>2 SWS</td>
<td>Practical course / ‼</td>
<td>Teltschik, Matthiesen, Hohmann</td>
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Legend: 🖥 Online, ⚽ Blended (On-Site/Online), ⚾ On-Site, ❌ Cancelled

**Prerequisites**

None